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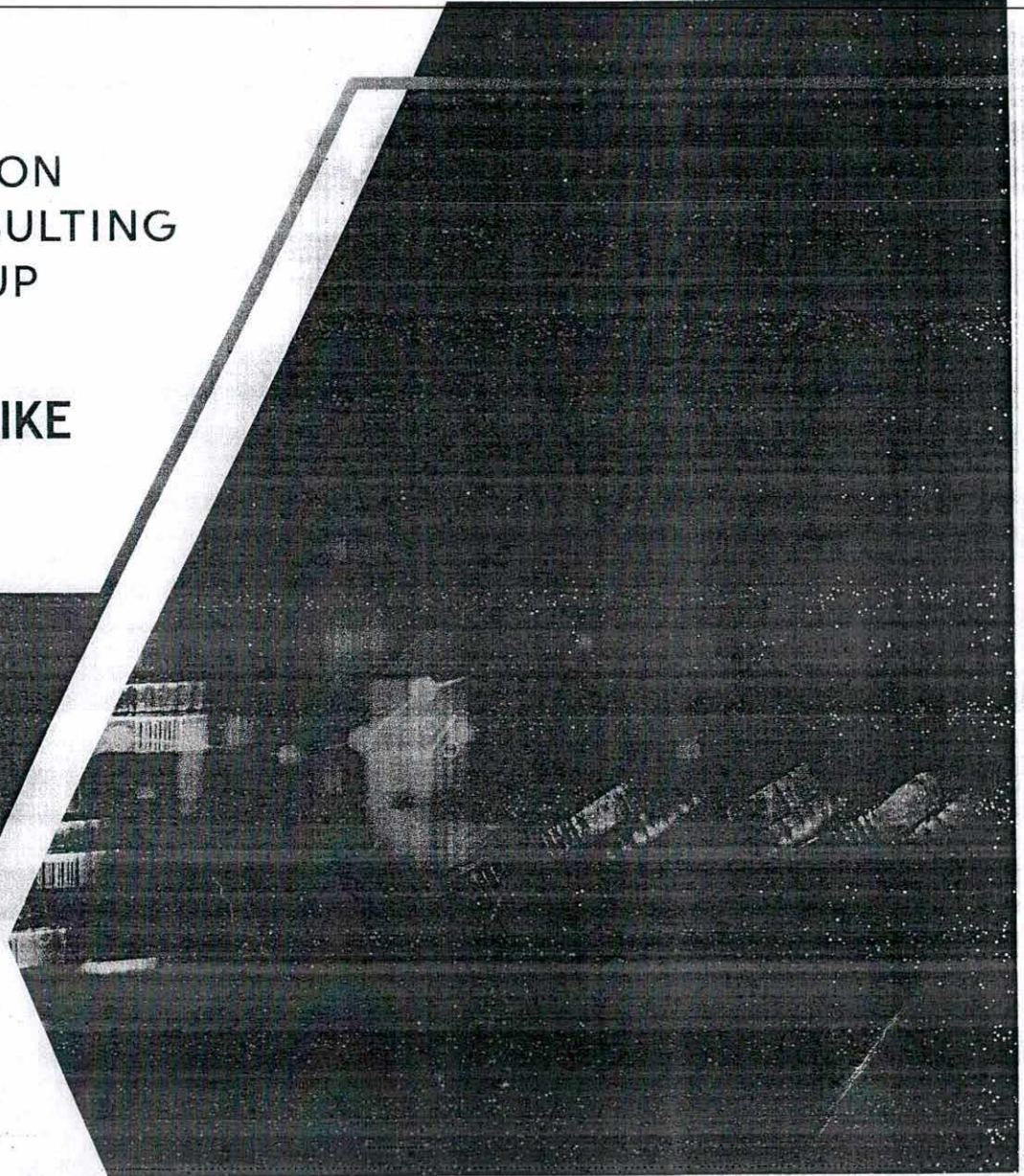
# BBMP Financial Sustainability Strategy

**PROJECT STRUCTURING AND DEVELOPMENT  
MODEL REPORT- DELIVERABLE #2**

MARCH 2025

Executive Engineer-8  
Bengaluru Smart Infrastructure Ltd.  
(B-SMILE) Bengaluru

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## Foreword



07 March 2025

**Subject:** Submission of Deliverable #2 - *Strategic Consultancy Services for Financial Sustainability-led Transformation of BBMP*

**Reference:** Assignment Order No. EE/Infra Div/RI/PR/228/2024-25 issued to Boston Consulting Group for delivering *Strategic Consultancy Services for Financial Sustainability-led Transformation of BBMP*, dated 24.01.2025.

This engagement involves exploring opportunities to enhance BBMP's revenue streams, assessing innovative financing mechanisms, evaluating project structuring and development models for key infrastructure initiatives, designing monitoring and control frameworks, and designing organization structure to adapt to the new financial strategies.

In line with the deliverables outlined in **Tender Notification No. EE/RI/Road Infra Division/TEND/16/2024-25**, dated 30.11.2024, and the **Work Order notification No. EE/Infra-Division/R1/WO/14/2024-25** dated 10.02.25, we hereby submit **Deliverable #2 - Project Structuring and Development Model Report**. The report has been submitted via email as a soft copy, along with **five hard copies** for your reference.

  
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Yours sincerely,

Managing Director & Partner  
Boston Consulting Group



## Table of contents

| S. No. | Topic                                                                | Page Number |
|--------|----------------------------------------------------------------------|-------------|
| 1      | Project Background                                                   | 3           |
| 2      | Objectives of Project structuring and development model Report       | 5           |
| 3      | Context and Project Objectives                                       | 8           |
| 4      | Bengaluru Twin-Tunnel Project                                        | 16          |
|        | 4.1 Project overview                                                 | 17          |
|        | 4.2 Benchmarking of other Tunnel Projects                            | 22          |
|        | 4.3 Project Structuring of Packages and Potential development Models | 30          |
|        | 4.4 Novel Development Model: Improvised Variable-BOT                 | 38          |
|        | 4.5 Novel Development Model: Ballooning Hybrid Annuity Model         | 49          |
|        | 4.6 Financial Model and Scenario Analysis                            | 57          |
|        | 4.7 Key proposed changes in the bid documents                        | 65          |
| 5      | Integrated Solid Waste Management                                    | 68          |
|        | 5.1 Project Overview and Scope                                       | 69          |
|        | 5.2 Project Structuring                                              | 76          |
|        | 5.3 Project Financial Model                                          | 79          |



# 1. Project Background



## Project Background

Bengaluru, as the fifth-largest metropolis in India, faces significant urban challenges due to rapid population growth, particularly in traffic congestion and connectivity. With over 14 million residents and more than 8 million vehicles, the demand for efficient infrastructure solutions is critical. In response, the Bruhat Bengaluru Mahanagara Palike (BBMP) has initiated several large-scale infrastructure projects aimed at addressing key transportation issues and supporting urban development.

However, implementing these projects requires a stable financial foundation to ensure timely execution and long-term sustainability. A thorough assessment of BBMP's financial position is necessary to identify gaps, strengthen revenue streams, and improve cost efficiency. Revenue augmentation through measures such as enhanced tax collection, better asset utilization, and diversified funding mechanisms can help reduce dependence on traditional sources. At the same time, cost optimization strategies—including improved budgeting, procurement reforms, and process efficiencies—are essential to maximize the impact of available resources.

Ensuring the successful execution of these mega infrastructure projects is crucial, as delays and cost overruns can significantly impact urban mobility and economic growth. Robust project monitoring and management frameworks must be established to track progress, mitigate risks, and enhance accountability. Leveraging technology for real-time data analysis, enforcing stricter timelines, and adopting transparent governance mechanisms will help drive efficiency and cost-effective project execution. A well-coordinated approach with robust organization structure and strong oversight will ensure that infrastructure projects are completed on time and within budget, maximizing their benefits for the city.

A structured financial and organizational approach will allow BBMP to manage risks, respond to unforeseen challenges, and sustain infrastructure development. By integrating financial sustainability with institutional strengthening, BBMP can enhance its ability to plan, execute, and maintain urban projects, ensuring long-term benefits for Bengaluru's residents.



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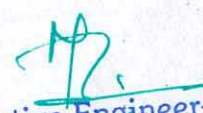
## 2. Objective of Project structuring and development model Report



## This document should be considered as the Project structuring and development model Report

Project start date (T0) - 24<sup>th</sup> Jan 2024

| S. No. | Deliverables                                               | Timeline (from start) | Due date for submission     |   |
|--------|------------------------------------------------------------|-----------------------|-----------------------------|---|
| 1      | Report #1 - Inception Report                               | T0 + 2                | 7 <sup>th</sup> Feb 2025    | ✓ |
| 2      | Report #2 - Project structuring & development model report | T0 + 6                | 7 <sup>th</sup> Mar 2025    | ✓ |
| 3      | Report #3 - Financial and funding plan for BBMP for next 5 | T0 + 12               | 18 <sup>th</sup> April 2025 |   |
| 4      | Report #4 - Progress Report 1                              | T0 + 16               | 16 <sup>th</sup> May 2025   |   |
| 5      | Report #5 - Progress Report 2                              | T0 + 21               | 20 <sup>th</sup> June 2025  |   |

  
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The objective of this report is to provide a detailed analysis of the project structuring and development model for two of the prioritized projects

1

Bengaluru  
Twin-Tunnel Project  
(North-South Corridor)

2

Integrated Solid Waste  
Management  
Plant tender

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## Contents

- Project Overview
- Benchmarking of other similar projects
- Project structuring and development model
- Novel Development model
- Financial model and scenario analysis
- Key proposed changes in bid documents



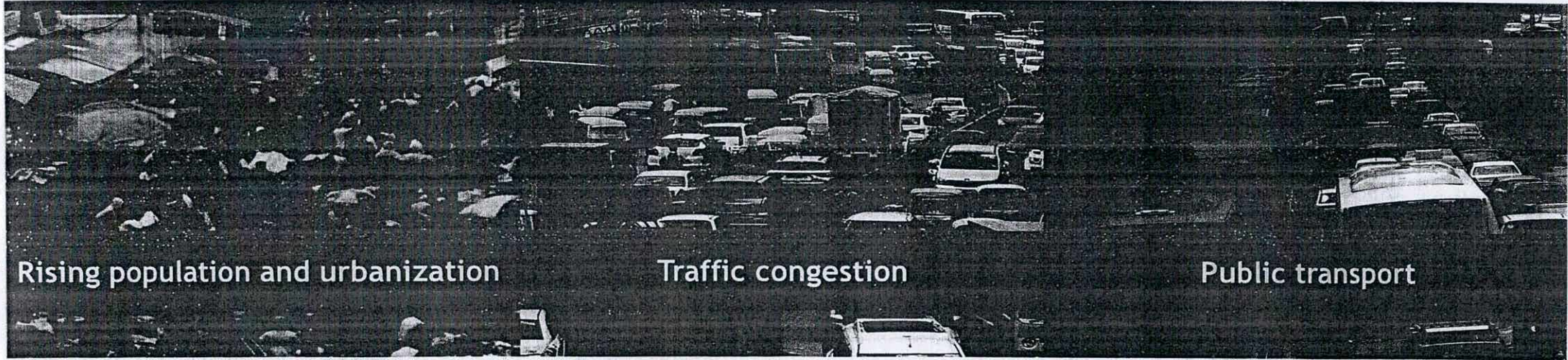
### 3. Context & Project objectives

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## The city of Bengaluru faces 6 key challenges w.r.t. urban infrastructure (1/2)



Rising population and urbanization

Traffic congestion

Public transport

Bengaluru's rapid population growth is putting immense pressure on housing, infrastructure, and essential services, leading to overcrowding and strain on city resources

Heavy traffic congestion is a result of insufficient road infrastructure, inadequate public transport, and the city's high reliance on private vehicles

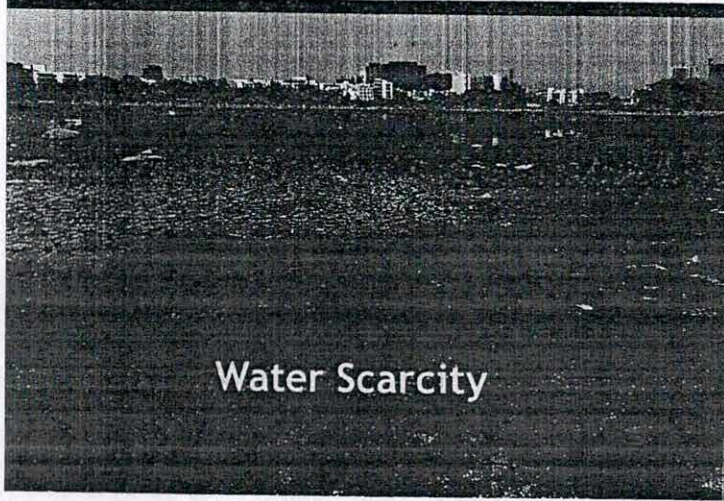
The public transport system is inadequate for the growing population, leading to over-dependence on road vehicles, worsening traffic and pollution

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## The city of Bengaluru faces 6 key challenges w.r.t. urban infrastructure (2/2)



Water Scarcity

The city faces severe water shortages due to over-dependence on the Cauvery River and rapid groundwater depletion, with demand far exceeding supply



Unplanned growth

Unregulated construction and encroachment on lakes and drains causing environmental degradation and frequent urban flooding during rains



Waste management

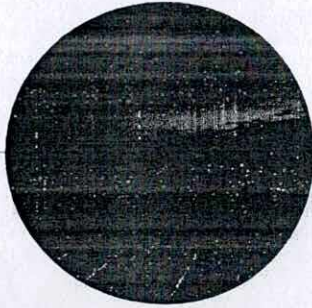
Ineffective waste management systems, leading to improper waste disposal, insufficient recycling, and overburdened landfills

  
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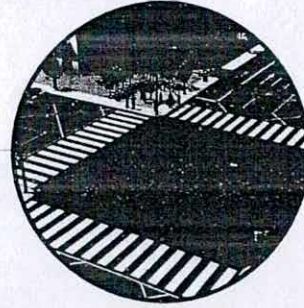


BBMP has undertaken key infrastructure projects to alleviate traffic, address water scarcity, improve waste management, and enhance urban services (1/2)



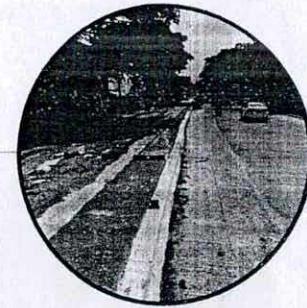
### Smart city project

- Projects like LED lighting for landmarks and One City One App enhance urban services
- Aims to reduce the city's carbon footprint and increase citizen access to services
- Pushes Bengaluru towards becoming a tech-driven smart city



### Model roads initiative

- BBMP partnered with CSR programs to develop model roads with improved lighting, footpaths, and regular upkeep
- Roads are maintained daily, ensuring high standards compared to typical city roads
- Encourages public-private partnerships for urban infrastructure development



### White topping roads

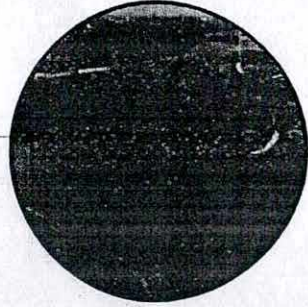
- INR 1,200 crore project covering 63 km of key roads to enhance durability and prevent potholes
- Improves road quality, reduces long-term maintenance costs, and enhances safety for commuters
- Lowers long-term maintenance costs with fewer repairs needed

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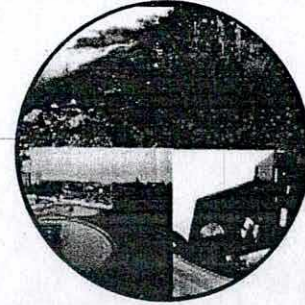


BBMP has undertaken key infrastructure projects to alleviate traffic, address water scarcity, improve waste management, and enhance urban services (2/2)



#### Restoration of lakes

- Rejuvenated lakes like Madiwala and Kaikondrahalli improve water quality and biodiversity
- Reduces urban flooding and promotes environmental sustainability
- Offers recreational spaces and hosts community events



#### Integrated solid waste management

- Established modern waste processing plants for better segregation and recycling
- Reduces landfill usage and promotes a cleaner environment
- Improves public health by addressing improper waste management issues

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Further, the authority plans to undertake major infrastructure projects worth INR 50,000 Cr+ to address these issues (1/2)



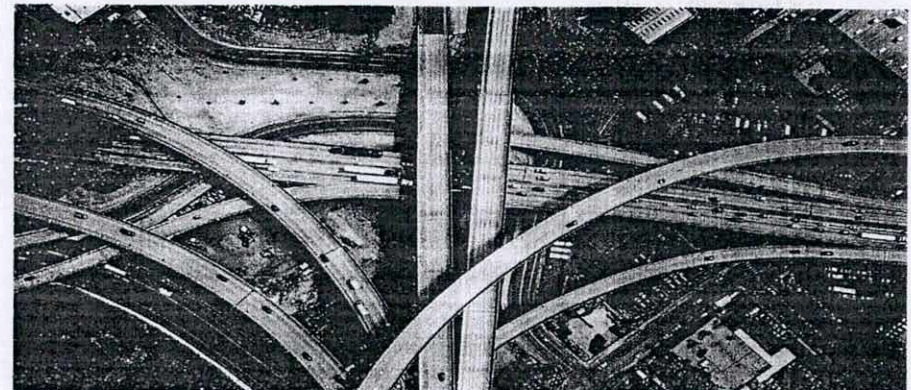
### Twin tube tunnel project



- Enable faster connectivity between Hebbal Junction and Silk Board (North-South Tunnel) and KR Puram to Mysuru Road (East-West Tunnel)
- Divert long-distance vehicles and trucks via PRR, reducing traffic inside the city
- Expected to alleviate traffic at 15 key congestion points, including ORR



### Elevated corridors



- Reduces congestion by creating elevated roads above busy ground-level routes
- Compensation for affected landowners through cash and TDR (Transferable Development Rights)
- Surrounding areas will include essential social infrastructure, like schools and parks

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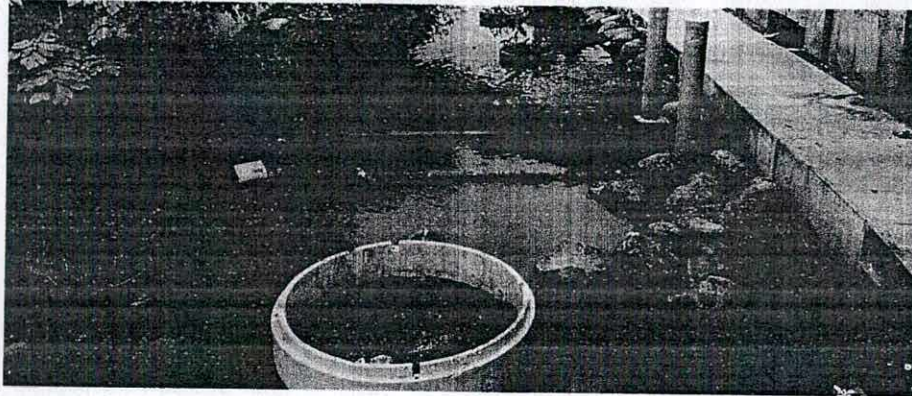
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Further, the authority plans to undertake major infrastructure projects worth INR 50,000 Cr+ to address these issues (2/2)



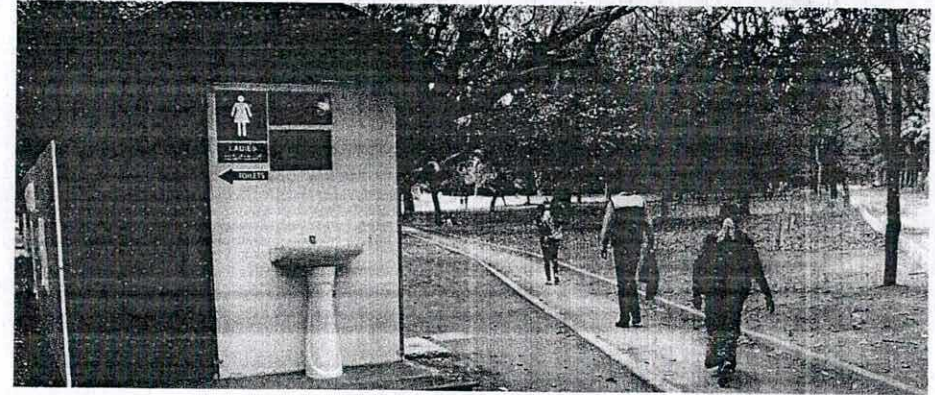
### Stormwater drain beautification



- Project will include upgrading and beautifying the existing stormwater drains to reduce flooding and improve water flow during heavy rains
- Adds commercial development opportunities near beautified canals
- Enhances flood management, especially in flood-prone areas



### Pedestrian walkways and She toilets



- 100 She toilets will be installed across the city to provide safe and hygienic facilities for women, particularly in high-traffic pedestrian zones
- Generates revenue through VCF, impact fees, and advertising
- This project aims to create world-class pedestrian infrastructure, enhancing the walking experience and safety for citizens

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As BBMP continues to drive sustainable urban development in the Bengaluru city to enhance its livability - it will need to become more financially robust

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## 4. Bengaluru Twin-Tunnel Project (North-South Corridor)



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## 4.1 Project Overview



# Bengaluru Twin-Tunnel Project (North-South Corridor)

16 km+

Total length of the North-South corridor

13.5 m+

Diameter of the main tunnel

3+3 lanes

Carriageway for underground travel

Twin tunnel

Main tunnel with TBM method

5 Hubs

Multi modal/interchange Hubs across the corridor

80 kmph

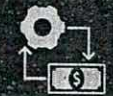
Design Speed of the main tunnel

>75%

Significant reduction in travel time 90min  $\square$  20min

~INR 330

Toll for one-way end to end travel

  
Lower congestion  
improves LOS from  
E-F  $\rightarrow$  F-C

  
Reduced  
carbon footprint

  
Better citizen  
outcomes

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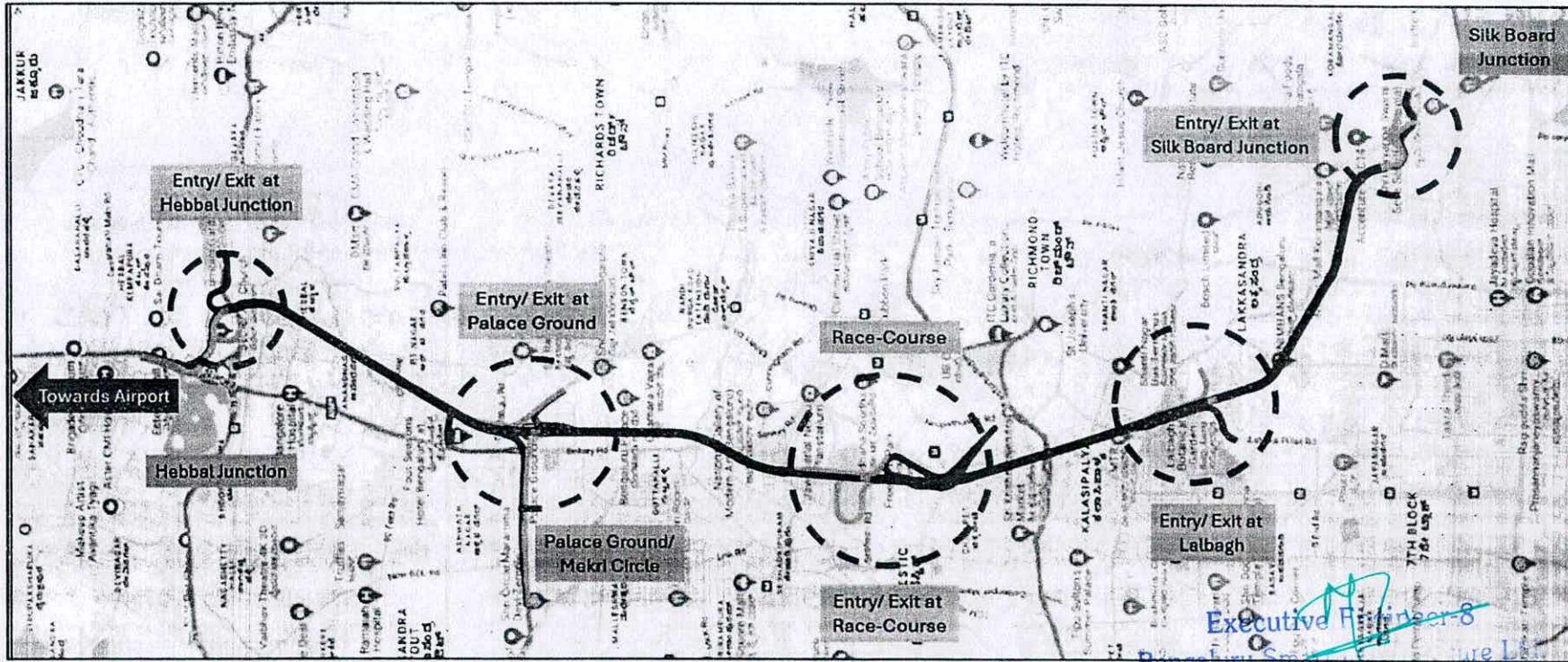
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## Project Overview

# Project Alignment | North-South corridor running from Hebbal to Silk Board Jn.

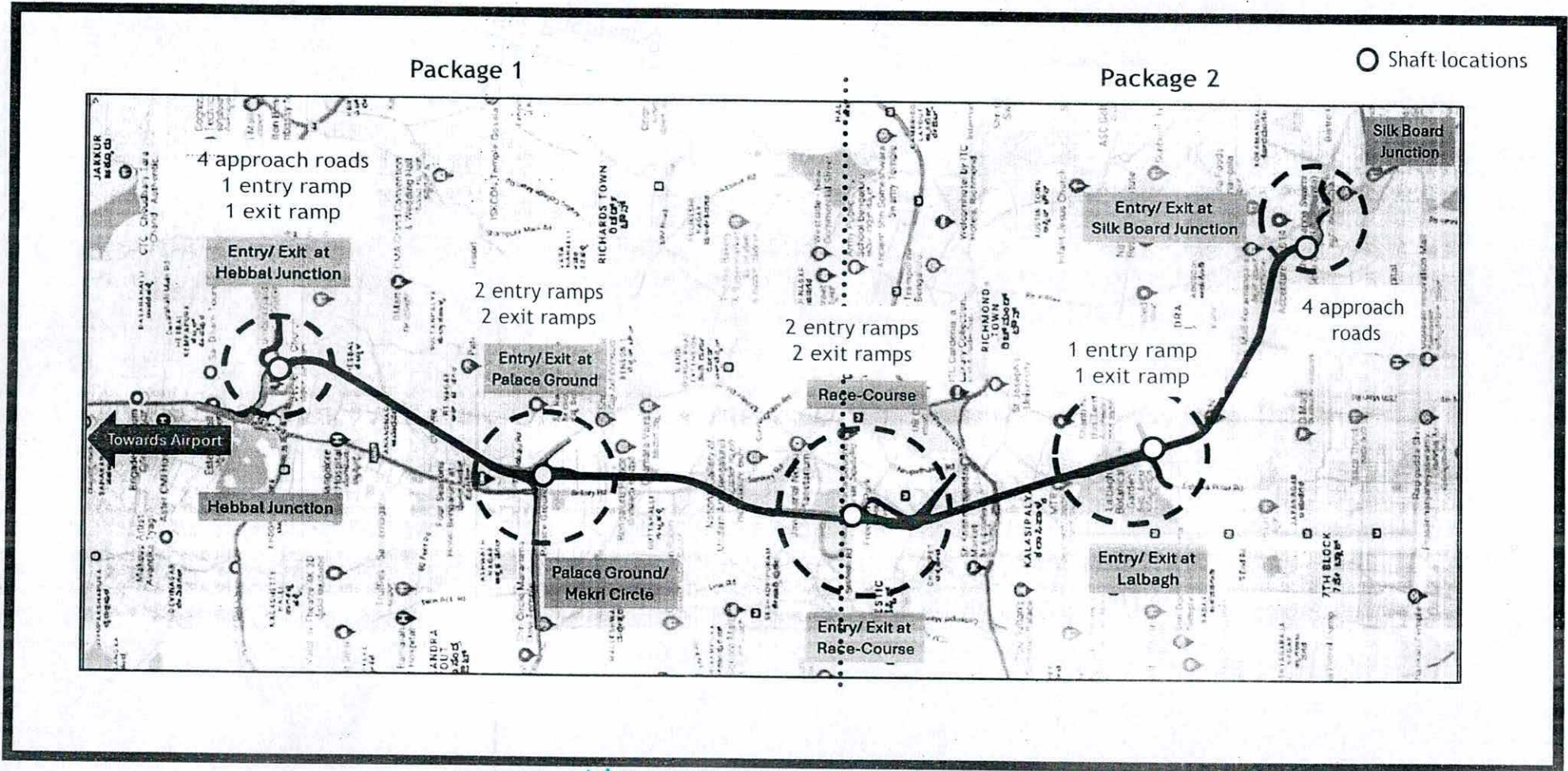
- Terminal points at Hebbal & Silk Board Jn.
- 3 Intermediate locations to provide connectivity in the city: Near Palace Ground, Near Race Course/Vidhan Saudha, Near Lalbagh Botanical garden with entry/exit ramps



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## Project Alignment | Ramps, Approach Roads and Shaft Locations



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## Project Overview

## Construction Method

- Main tunnel to be planned with TBM technology
  - Estimated 4 TBM (Slurry shield) Machines per Package
- NATM, Cut-and-cover, Open-cut methods to be used for approach roads and ramps
- 5 Shaft Locations proposed for launching and retrieval of TBMs (2nos for Package-1 and 3nos for Package-2)

| Length in km                |                             | Package 1 | Package 2 | Total |
|-----------------------------|-----------------------------|-----------|-----------|-------|
| Absolute project length     |                             | 8.7       | 8.0       | 16.7  |
| Length in km (both tunnels) |                             | Package 1 | Package 2 | Total |
| Main Tunnel                 | TBM                         | 14.4      | 14.1      | 28.5  |
| Tunnel and Approach roads   | Cut & cover                 | 1.7       | 0.7       | 2.4   |
|                             | Open-cut                    | 1.0       | 0.5       | 1.5   |
| Intermediate ramps          | NATM, cut & cover, open-cut | 8.0       | 9.2       | 17.2  |

  
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## 4.2 Benchmarking of other Tunnel Projects

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## 5 key learnings from benchmarking of other tunnel projects

### 1. Most of the tunnels in India developed in EPC mode; few in HAM/BOT as well

- Recent projects such as Mumbai Coastal Road Phase-1 and 2, Thane-Borivali Tunnel being developed in EPC mode
- Shimla Bypass tunnel project being executed in HAM (4.5 km twin tunnel, SP Singla Constructions Pvt. Ltd. (25%), NHAI (75%))
- Chenani Nashri (NHAI, J&K, 9.2 km) done in BOT Annuity by IL&FS, but project sold to Cube Highways due to bankruptcy

### 2. Cost per km of tunnel higher for recent Indian tunnel projects as compared to current DPR estimate for BLR Twin Tunnel

- INR 700-750 Cr/km/tube for Mumbai Coastal Road Phase-2
- INR 600-650 Cr/km/tube for Thane-Borivali Tunnel (with softer soil than Bangalore)
- Vs. INR 550 Cr/km/tunnel for Bangalore twin tunnel project as per DPR estimate

### 3. Revenue largely driven by tolls; others either not tolled or generating revenue via other sources (such as land reclamation in Mum.)

- No tolling in Mumbai Coastal road (funded by BMC, Land reclamation of 90 hectares planned)
- Tolling done in Thane - Borivali (INR 200, full length), Chenani Nashri (INR 185, full length)

### 4. Most of the tenders structured into 4-5 km long tunnel packages (INR 5k - 6k Cr) to mitigate risk

- Mumbai Coastal Road Phase 2: 3.9 Km tunnels were packaged tube wise (INR 2900 Cr per package)
- Thane Borivali tunnel: 6.05 km and 5.75 km twin tunnels are packaged serially (INR 7200 Cr for P1, & 5900 Cr for P2)

### 5. Megha Engg., L&T leaders in Indian tunnel projects thus far; others include APCO Infracore Ltd. , J Kumar Infra

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## 8 Indian road tunnel projects benchmarked (1/2)

|  |  |                                  |  |  |                  |                                                                                                                                    |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project                                                                           | Timeline                                                                          | Configuration                                                                                                     | Cost <sup>1</sup>                                                                   | Dev. Mode                                                                           | Developer                                                                                           | Financing                                                                                                                                                                                                             |
| ✓ 1 Mumbai Coastal road Phase 1 (BMC)                                             | 6 years (2018-2024)                                                               | - 10.58 km road divided in three packages (8 lanes)<br>- 2.07 Km twin tunnel (6 lanes)                            | INR 9,600 Cr<br>• Cost per Km for tunnel part: INR 400 - 500 Cr/km/tube (3 lanes)   | EPC                                                                                 | Pkg. 1, Pkg. 4: L&T<br>Pkg. 2: HCC (55%) - HDC(45%) JV                                              | <ul style="list-style-type: none"> <li>No tolling, land reclamation for monetization</li> <li>Budget allocation from BMC, no external aid</li> </ul>                                                                  |
| ✓ 2 Mumbai Coastal road Phase 2 (BMC)                                             | Tenders awarded, construction yet to start                                        | - 20.4 km road divided into 6 packages (8 lanes)<br>• 2 tunnel packages : Twin tunnel, 3.9 Km each (3 lanes each) | INR 16,600 Cr<br>• Cost per Km for tunnel part: INR 700 - 750 Cr/km/tube (3 lanes)  | EPC                                                                                 | Pkg. A: APCO<br>Pkg. B: L&T<br>Pkg. C: MEIL<br>Pkg. D: MEIL<br>Pkg. E: J Kumar, NCC<br>Pkg. F: APCO | <ul style="list-style-type: none"> <li>No tolling, land reclamation for monetization</li> <li>Budget allocations from BMC, no external aids</li> </ul>                                                                |
| ✓ 3 Thane Borivali Tunnel Project (MMRDA)                                         | Started in 2024 (Expected 5 -8 years)                                             | - 10.25 km main tunnel with 1.55 km approach roads<br>- Twin tunnel 5.75 km and 6.05 km (3 lanes)                 | INR 13,000 Cr<br>• Cost per Km for tunnel part: INR 600 - 650 Cr/km/tube (3 lanes)  | EPC                                                                                 | Pkg. 1 (Borivali side, 5.75 km): MEIL<br><br>Pkg. 2 (Thane side, 6.05 km): MEIL                     | <ul style="list-style-type: none"> <li>Toll (INR 200 per veh.)</li> <li>Govt. interest-free loan: INR 2,417 Cr + add. 700 Cr for land acquisition</li> <li>Additional approval for MDB loans for 15,000 Cr</li> </ul> |
| 4 Atal Tunnel (Rohtang Pass) (BRO)                                                | 10 years (2010 - 2020)                                                            | 9.02 km Single tube (2 lane tunnel)                                                                               | INR 3,300 Cr<br>• Cost per Km for tunnel part: INR 350 - 400 Cr/km/tube             | EPC                                                                                 | JV b/w AFCONS (60%) & STRABAG AG (40%)                                                              | <ul style="list-style-type: none"> <li>No tolling</li> <li>Fully financed by the Govt. of India, with no private financing</li> </ul>                                                                                 |

1. Cost estimated at RFP stage  
Source: Expert interviews



Detailed further on the following pages



## 8 Indian road tunnel projects benchmarked (2/2)

| Project                                    | Timeline                       | Configuration                                                                                       | Cost <sup>1</sup>                                                                 | Dev. Mode                                                                                    | Developer                                                                                                       | Financing                                                                                                                  |
|--------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 5 Chenani - Nashri Tunnel (NHAI)           | 6 Years (2011 - 2017)          | 9.2 km connecting Chenani & Nashri NH 44 (Jammu-Srinagar Highway) twin tunnel, 4 lanes              | INR 3,720 Cr<br>• Cost per Km for tunnel part: INR 350 - 450 Cr/km/tube (2 lanes) | BOT (Annuity), with 20% VGF                                                                  | IL&FS Transportation Networks Ltd<br><br>Concession period: 20 years                                            | • Rev. from tolls<br>• Annuity payments by NHAI for 20 years                                                               |
| 6 Shimla Bypass (J&K) (NHAI)               | 3 years (2023 - 2026 expected) | 17.47 km, including 3 twin tunnels spanning 4.35 km                                                 | INR 1,845 Cr                                                                      | HAM<br>• 75% NHAI<br>• 25% SPSCPL                                                            | S P Singla Constructions Pvt Ltd (SPSCPL)<br>Concession period: 15 years                                        | • Rev. from tolls<br>• Annuity payments by NHAI for 15 years                                                               |
| 7 Zoji La tunnel (NHIDCL)                  | 7 years (2020 - 2027 expected) | 14.15 km, single tube tunnel with 2 lanes between Sonmarg and Drass                                 | INR 8,308 Cr                                                                      | EPC<br>*Tried HAM but failed                                                                 | Megha Engg. - EPC (2020)<br><br>*NHIDCL tried HAM IN 2018 but No bidders                                        | • No tolling<br>• Funded by National Highways & Infra. Dev. Corp. Ltd. (NHIDCL)                                            |
| 8 Kolkata East - West Metro Tunnel (KMRCL) | 15 years (2009 - 2024)         | 10.8 km (including 520 meters under the Hooghly River)<br>Package 1 (5.15 km) + Package 2 (4.02 km) | Final total cost: INR 10,442 Cr (incl. Cost overrun)                              | EPC<br> | - Package UG-1: Afcons-Transtunnelstroy JV<br><br>- Package UG-2: (Italian-Thai Development)-ITD Cementation JV | • Ticketing Revenue<br>• JICA loan of INR 4,158 Cr<br>• Min. of Railways: INR 3,268 Cr grant<br>• MoHUA INR 1,148 Cr grant |

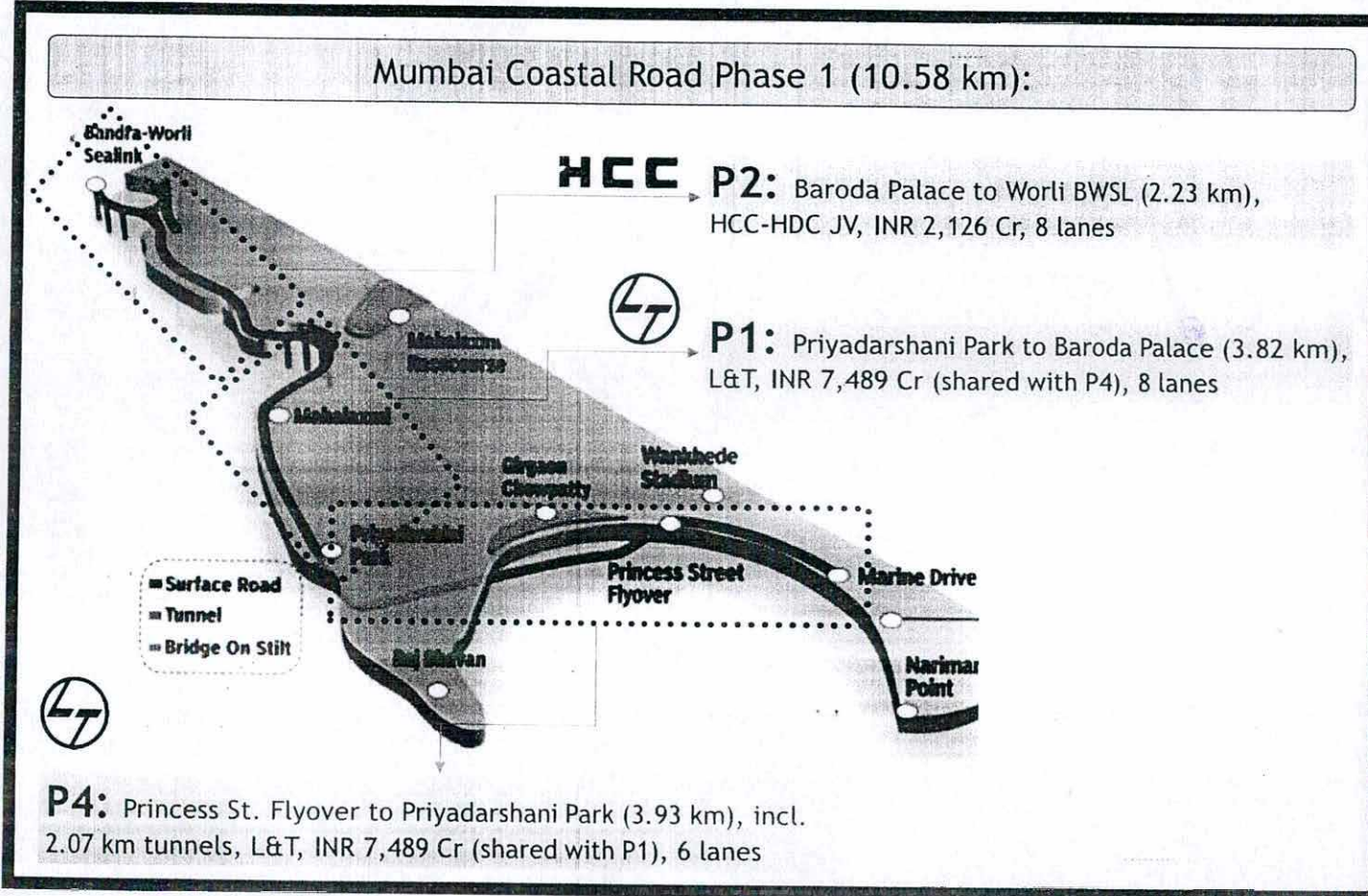
1. Cost estimated at RFP stage  
Source: Expert interviews

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## Mumbai Coastal Road Phase 1 developed in EPC mode by BMC



### Key Highlights

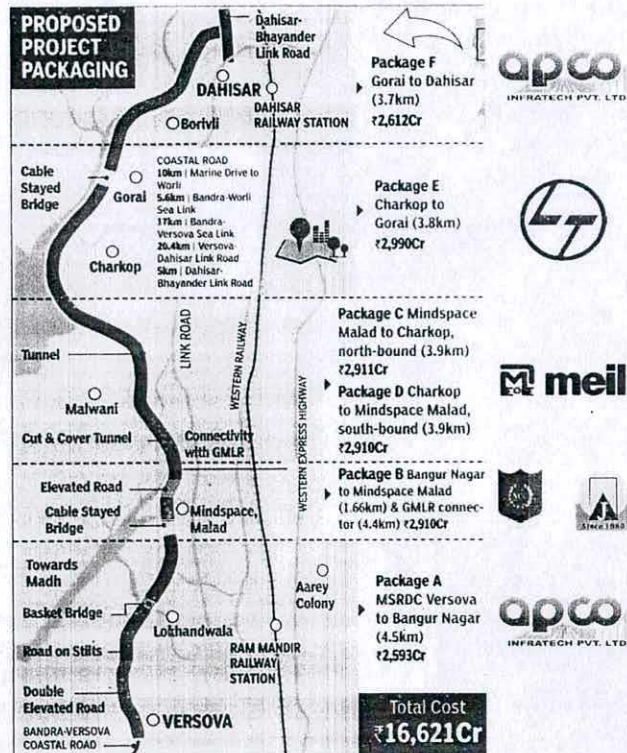
|  |                     |                                                                                                                                                                                                                           |
|--|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Cost</b>         | Total Cost: ~ INR 9600 Cr<br>Cost per Km of tunnel: ~ INR 400-500 Cr/km/tube                                                                                                                                              |
|  | <b>Duration</b>     | 6 years (2018-2024)                                                                                                                                                                                                       |
|  | <b>Revenue</b>      | No Tolling, 90 hectares land reclamation (70 hectares for public use, 20 hectares for monetization) - Phase 1 and Phase 2 combines                                                                                        |
|  | <b>Financing</b>    | Budget allocations from BMC, no external aids                                                                                                                                                                             |
|  | <b>Issues faced</b> | <ul style="list-style-type: none"> <li>Legal disputes over environmental concerns</li> <li>Utility shifting delays (1 year)</li> <li>Inaccurate geological surveys</li> <li>Delay due to COVID-19 (7-8 months)</li> </ul> |



## Benchmarking

# Mumbai Coastal Road Phase 2 developed in EPC mode by BMC

## Mumbai Coastal Road Phase 2 (20.4 km):



**F:** Gorai to Dahisar (3.69 km), APCO Infratech, INR 2,612 Cr, 6 lanes

**E:** Charkop to Gorai (3.78 km), Larsen & Toubro (L&T), INR 2,990 Cr, 6 lanes

**D:** Charkop to Mindspace (north-bound, 3.9 km), Megha Engineering, INR 2,911 Cr, 6 lanes

**C:** Mindspace to Charkop (3.9 km), Megha Engineering, INR 2,911 Cr, 6 lanes

**B:** Bangur Nagar to Mindspace (4.4 km), J Kumar InfraProjects & NCC, INR 2,910 Cr, 6 lanes

**A:** Versova to Bangur Nagar (4.5 km), APCO Infratech, INR 2,593 Cr, 6 lanes

## Key Highlights

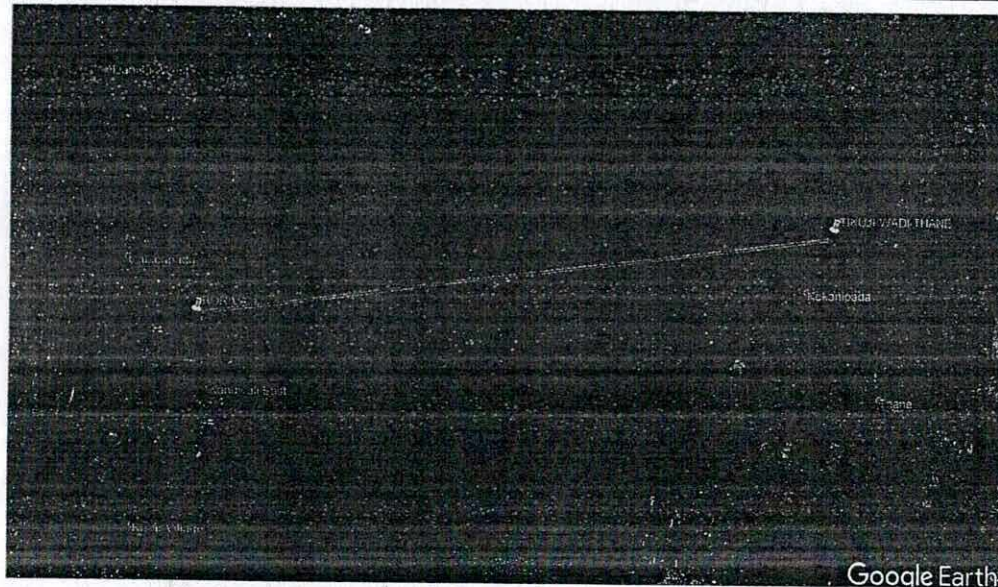
|              |                                                                                                                                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------|
| Cost         | Total Cost: - INR 16,600 Cr<br>Cost per Km of tunnel: - INR 700 - 750 Cr/km/tube                                                   |
| Duration     | Yet to start, Expected 5 - 8 years                                                                                                 |
| Revenue      | No Tolling, 90 hectares land reclamation (70 hectares for public use, 20 hectares for monetization) - Phase 1 and Phase 2 combines |
| Financing    | Budget allocations from BMC, no external aids                                                                                      |
| Issues faced | Legal disputes over environmental concerns (still in progress)                                                                     |



## Thane Borivali tunnel project developed in EPC mode by MMRDA

### Thane Borivali tunnel (11.8 Km) in 2 Packages

P1



P2

Google Earth

Thane Borivali (10.25 Km main tunnel with 1.55 Km approach roads):



Package 1 (Borivali side): 5.75 km, awarded to Megha Engineering & Infrastructures Ltd. (MEIL), with a project cost of INR 7,178 Cr



Package 2 (Thane side): 6.05 km, also undertaken by MEIL, at a cost of INR 5,879 Cr

### Key Highlights



Cost

Total Cost: ~ INR 13,000 Cr  
Cost per Km of tunnel:  
~ INR 600 - 650  
Cr/km/tube



Duration

Expected 5-8 years  
(2023-2028)



Revenue

Toll collection (INR 200 per vehicle), Four TBMs used; material repurposed for land reclamation or other construction uses



Financing

MMRDA approved loans of INR 15,000 Cr from Multilateral and Bilateral Development Banks  
Maharashtra Government interest-free loan of INR 2,417 Cr, with INR 700 Cr for land acquisition



Issues faced

Approvals from the National Board for Wildlife (NBWL) & Forest Department due to tunneling under Sanjay Gandhi National Park

  
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## Benchmarking

Global benchmarks indicate a higher uptake of BOT/PPP with consortium of multiple players taking up different functional roles

| Project                                            | Details                                                                                                                                                    | Cost                                                      | Dev. Mode                                                                                                                                | Developer                                                                                                                                                                                                                                                                                                                                                   | Financing                                                                                                                                                                                            |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 Channel Tunnel Project (Chunnel) - UK and France | 50.5 km rail tunnel connecting Folkestone (England) & Coquelles (France). Three parallel tunnels: two for passenger & freight trains, & one service tunnel | GBP 4.8 billion (final cost escalated to GBP 9.5 billion) | DBFMOT (Design, Build, Finance, Maintain, Operate, Transfer) under PPP, with a 99-year concession (extended from the original 55 years). | Package 1: Tunnel boring, TransManche Link: Bouygues, Dumez, Costain, Taylor Woodrow, SGE, Balfour Beatty (French-UK consortium)<br>Package 2: Shuttle Train Systems and Infrastructure                                                                                                                                                                     | <ul style="list-style-type: none"> <li>GBP 8 billion raised from a syndicate of 5 banks: HSBC, BNP Paribas, Crédit Agricole, Banque Indosuez, RBS</li> </ul>                                         |
| 2 Laerdal Tunnel (Norway)                          | 24.5 km (single tube, double lane), connecting Aurland and laerdal in Norway.                                                                              | NOK 1.08 billion (- USD 113 million)                      | EPC, with the Norwegian Public Roads Administration (NPRA)                                                                               | Key Contractor: Interconsult for electrification & safety systems.<br>Local Contractors: tunneling, blasting, & construction work.                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>No tolling, land reclamation for monetization</li> <li>Budget allocations from NPRA, no external aids</li> </ul>                                              |
| 3 Hong Kong-Zhuhai-Macau Bridge (HZMB)             | 55 km, consisting of 29.6 km of bridges and a 6.7 km immersed undersea tunnel (single tube, dual lane)                                                     | USD 18.8 billion (USD 7.6 Billion for tunnel)             | BOT, with 50 years concession period                                                                                                     | Tunnel Package: JV of China Communications Construction Company Ltd. (CCCC), AECOM Asia, & Shanghai Tunnel Engineering & Rail Transit<br>Main Bridge Package: COWI A/S and Ove Arup & Partners.<br>Femern A/S, a subsidiary of the Danish state-owned company.<br>Key contractors: Vinci Construction Grands Projets, BAM Infra, PER Aarsleff, and Max Bogl | <ul style="list-style-type: none"> <li>Government Funding: 42%</li> <li>Private Loans: 58%, with loans led by the Bank of China</li> <li>Toll collection, revenue from artificial islands</li> </ul> |
| 4 Fehmarnbelt Tunnel (Denmark & Germany)           | 8 km immersed tunnel-Rødbyhavn (Denmark to Puttgarden (Germany)                                                                                            | EUR 7.1 billion (- USD 8.2 billion)                       | EPC                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>State guaranteed loans</li> <li>EUR 1.1 billion in grants through the Connecting Europe Facility (EU)</li> <li>Tolling by Femern A/S</li> </ul>               |

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## 4.3 Project Structuring of Packages and Potential development Models

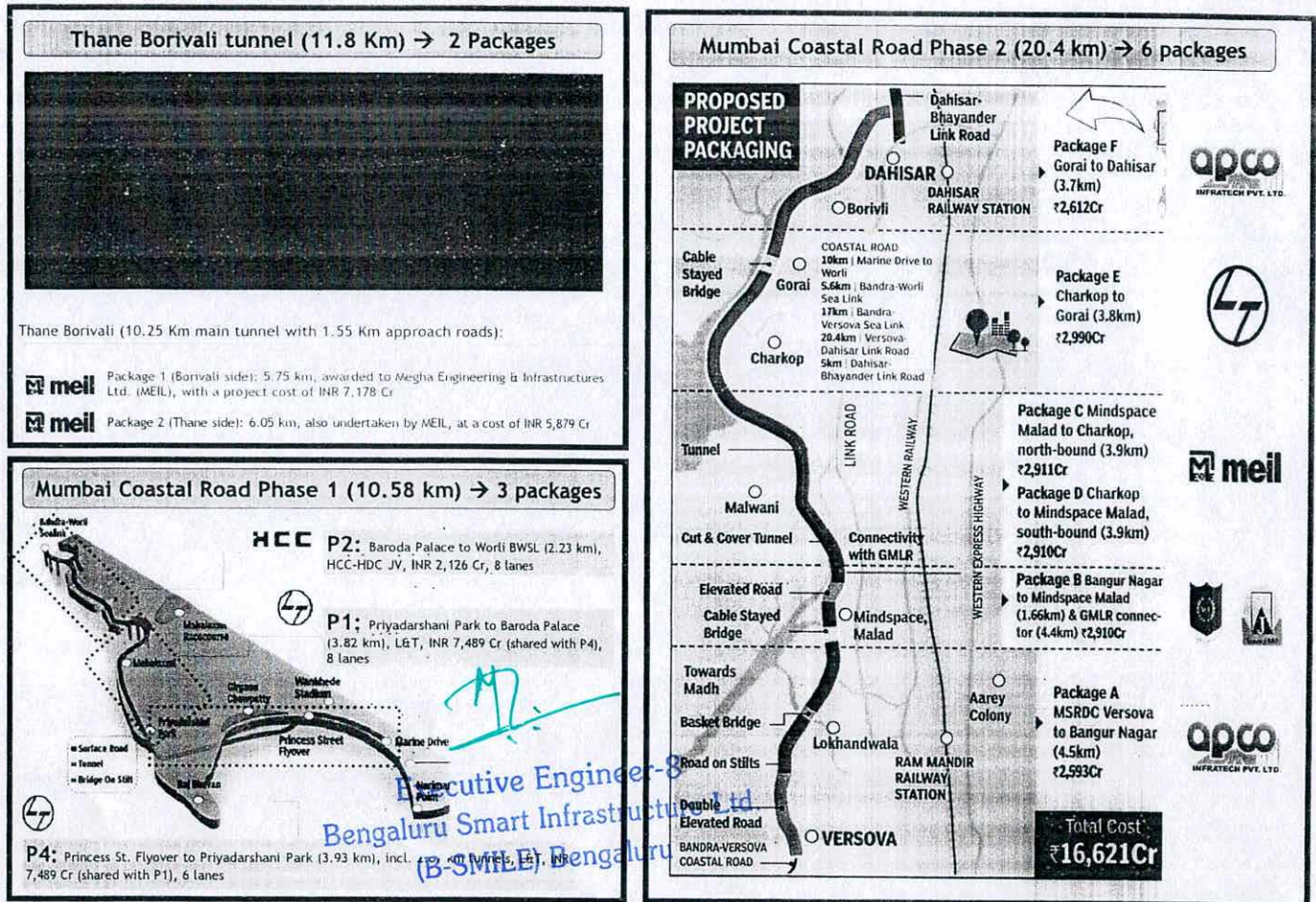
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## Packaging structure

Packaging structure | Major projects divided into packages for execution

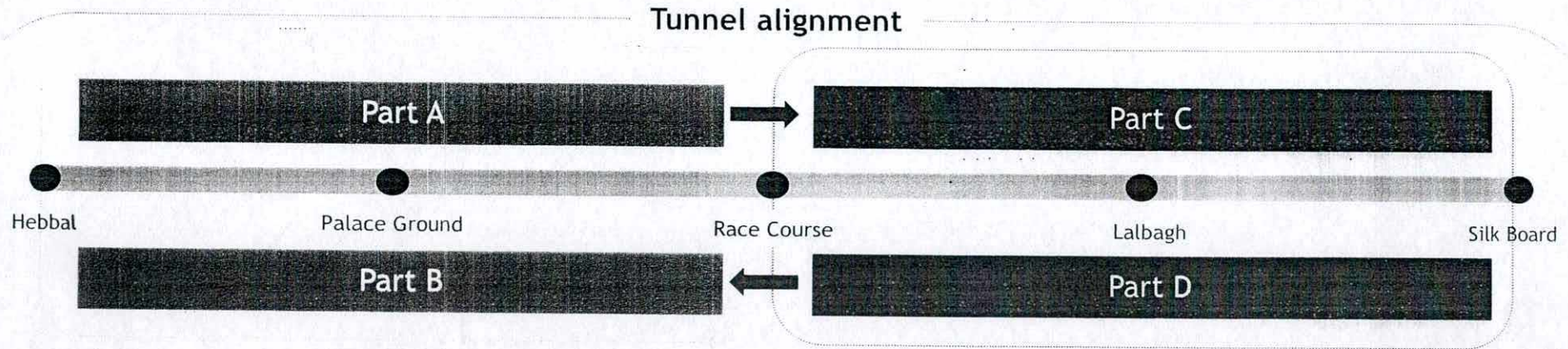
Tenders are typically structured into 4-5 km long tunnel packages (INR 5k - 6k Cr) to mitigate risk



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## Project packaging structure | Project will be tendered in 2 Packages



### Package-1

Design and Construction of 3-Lane Underground Twin Tunnel Road from Hebbal Esteem Mall junction (Km. 0+000) and Silk Board KSRP Junction (Km.16+745) along with 3-lane/2-lane entry & exit ramps on Improved BOT (Toll) Mode including operation and maintenance in Bengaluru City (North South Corridor).  
Package-1: Hebbal near Esteem mall junction to Seshadri road, Freedom Park (Km 8+748).

### Package-2

Design and Construction of 3-Lane Underground Twin Tunnel Road from Hebbal Esteem Mall junction (Km. 0+000) and Silk Board KSRP Junction (Km.16+745) along with 3-lane/2-lane entry & exit ramps on Improved BOT (Toll) Mode including operation and maintenance in Bengaluru City (North South Corridor),  
Package-2: Seshadri Road (Km 8.748) to Silk Board (Km 16.745).

  
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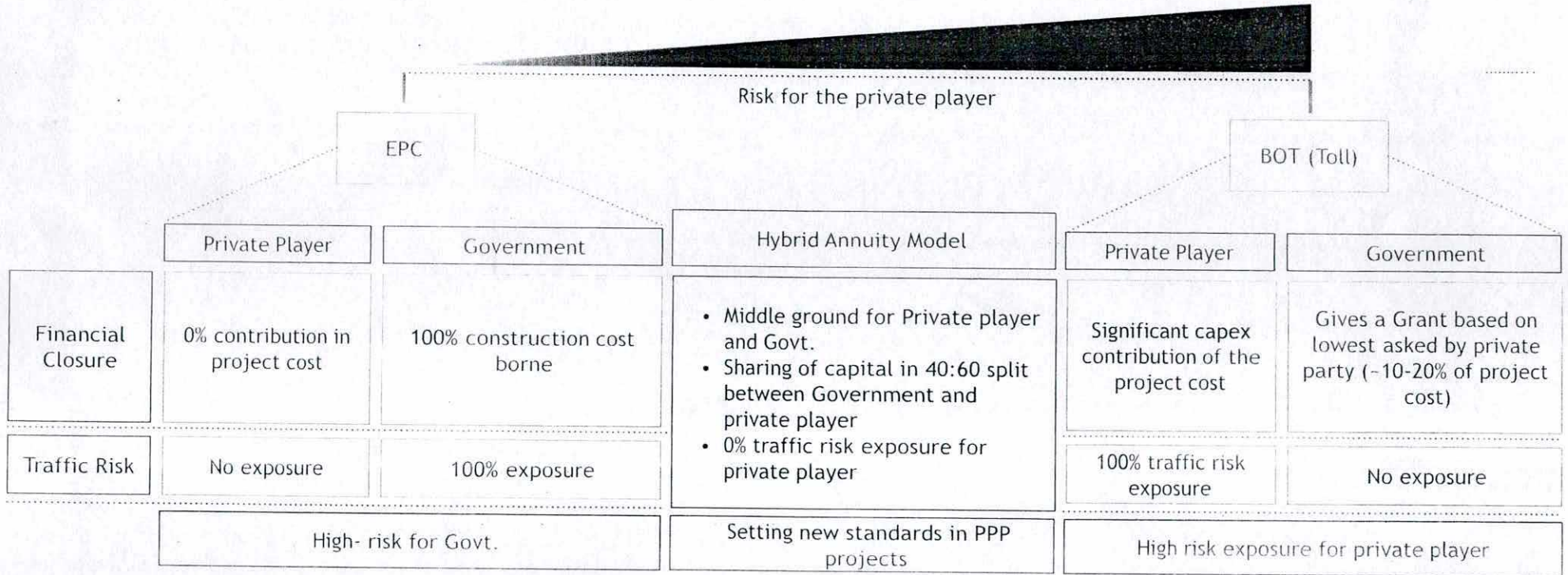
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# Potential project development models



Various development models need to be evaluated and bundled to redistribute risks appropriately (1/2)



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## Various development models need to be evaluated and bundled to redistribute risks appropriately (2/2)

### Project Risk/Contract Model

|                                                                                                                         | EPC | HAM  | DBOT - T |
|-------------------------------------------------------------------------------------------------------------------------|-----|------|----------|
|  Design                                | P   | P    | P        |
|  Construction                          | P   | P    | P        |
|  Operations                            | G   | P    | P        |
|  Revenue Forecast                      | G   | G    | P        |
|  Revenue Collection                    | G   | G    | P        |
|  Finance                              | G   | G+P  | P        |
|  Risks assumed by the private player | Low | High | Medium   |

Non exhaustive

Construction + design  
+ item rate  
contracts risks

Govt. infuses part funding  
during constructions,  
ensures indexation of  
costs & O&M payments

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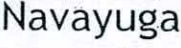
**G** Government **P** Private **G+P** Government + Private

EPC = Engineering, Procurement & Construction; DBO = Design-Build-Operate; DBOT = DBO-Transfer; T = Toll

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Market response and interest from private developers across various development models

|                 | EPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | HAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | BOT                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Partial package |       |        |     |
| Full package    |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |

Other developers who were approached but refused to participate:

**GAR**

**JSW**  
Infrastructure

**BOUYGUES**  
CONSTRUCTION

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## Development Models

Preference

High Medium Low

While BOT is favorable for the Authority, and EPC is preferred by the Developers - HAM emerges as the middle ground

| Authority PoV                                    | EPC                                                 | HAM                                                         | BOT                                                                         |
|--------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------|
| Extent of competition                            | Highest no. of bids expected                        | Sizeable no. of bids expected                               | Very few bids expected                                                      |
| Govt. financial outlay                           | Entirely funded by Government                       | About 40% upfront from Govt., 60% from toll revenues        | Only VGF funding                                                            |
| Revenue risk for the Govt.                       | High                                                | High                                                        | Low - Risk passed to Developer                                              |
| Construction risk                                | Low                                                 | Low                                                         | Medium, risk of insufficient funds                                          |
| Quality of construction                          | Payments not linked to performance                  | Potential to withhold annuity                               | Performance affects traffic and tolls                                       |
| Risk of toll leakages (loss of value extraction) | Typically collected by Govt. or separate contractor | Typically collected by Govt. or separate contractor         | Toll collection by Private player                                           |
| HAM: Middle ground                               |                                                     |                                                             | Authority preference                                                        |
| Developer PoV                                    | EPC                                                 | HAM                                                         | BOT                                                                         |
| Developer investment required                    | Minimal, full investment done by Govt.              | 60% project cost to be invested, later recouped via Annuity | Majority project cost to be invested by Developer, with some VGF from Govt. |
| Revenue risk for Developer                       | Zero                                                | Limited                                                     | Full traffic risk borne by the Developer                                    |
| Payment risk for concessionaire                  | Risk of delayed payments by Govt.                   | Risk of delayed payments by Govt.                           | Limited dependence on govt. payments - mainly for collecting toll revenue   |
| Returns                                          | Fixed returns, low risk                             | Fixed returns, but over a longer time period                | Variable returns                                                            |
| Developer preference                             |                                                     |                                                             |                                                                             |

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## 4.4 Novel Development Model: Improvised Variable-BOT



Improvise Variable BOT

Novel Development  
Model 1:

Improvise Variable-BOT  
(Toll) Model

Key Parameters

### Improvise Variable-BOT model to manage traffic & revenue risk

- 1 The bidders quote TCV (Total Concession Value), equivalent to the toll revenue they seek to recover the costs associated with the project *(excluding ancillary revenues)*
- 2 The Concession Period goes on till the discounted value of tolls collected by developer is equal to the TCV, reviewed annually *(frequency changed to monthly after 90% TCV achieved)*
- 3 Revenues are discounted at Authority set discounting rate, to get real values as of Appointed Date  
*(Discounting rate: SBI 3-year MCLR + 2.5%, as per IRC 136-2023, MoRTH)*
- 4 Authority provides fixed Viability Gap Funding at **40% of the Estimated Project Cost**
- 5 Concession period can be **extended by up to 10 years** and terminated as soon as bid TCV is realized, i.e., no minimum concession period  
*(Additional increase of 5 years in case of Competing road/additional tollway)*

  
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## V-BOT Illustration | Extension of Concession due to lower revenues

Example 1: Bid TCV = INR 5,000 Cr, planned concession = 5 years

| Year | Actual toll revenue | 3y MCLR in the year | NPV(tolls collected) | Remaining TCV | Verdict             |
|------|---------------------|---------------------|----------------------|---------------|---------------------|
| 2025 |                     | 9.00%               | 0                    | 5,000 Cr      |                     |
| 2026 |                     | 9.00%               | 0                    | 5,000 Cr      |                     |
| 2027 | Construction period | 9.10%               | 0                    | 5,000 Cr      | Construction period |
| 2028 |                     | 9.20%               | 0                    | 5,000 Cr      |                     |
| 2029 |                     | 9.05%               | 0                    | 5,000 Cr      |                     |
| 2030 |                     | 9.10%               | 0                    | 5,000 Cr      |                     |
| 2031 | 1,500 Cr            | 9.00%               | 781 Cr               | 4,219 Cr      | Continue            |
| 2032 | 1,800 Cr            | 9.10%               | 835 Cr               | 3,384 Cr      | Continue            |
| 2033 | 2,000 Cr            | 9.20%               | 825 Cr               | 2,559 Cr      | Continue            |
| 2034 | 2,200 Cr            | 9.30%               | 806 Cr               | 1,753 Cr      | Continue            |
| 2035 | 2,400 Cr            | 9.25%               | 790 Cr               | 963 Cr        | Continue            |
| 2036 | 2,600 Cr            | 9.15%               | 774 Cr               | 189 Cr        | Extend              |
| 2037 | 2,800 Cr            | 9.20%               | 742 Cr               | -553 Cr       | Terminate           |

Here, Concession year increased to 7 years to ensure recovery of bid TCV

How to calculate

NPV (tolls collected)

$$= \frac{\text{Actual toll}}{(1 + \text{discounting rate})^{(\text{Year} - 2025)}}$$

Discounting rate

= SBI's 3year MCLR that year + 2.5%  
(as per MoRTH)

Remaining TCV

= Remaining TCV in previous year -  
NPV(tolls collected in that year)

Verdict

= if Remaining TCV in that year > 0  
→ Continue, else Terminate  
OR, if concession period = 40 years  
→ Terminate

Concession period will be capped at a maximum of 40 years, beyond which even if NPV(Toll revenues) is not equal to TCV, the concession period will be terminated.

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## V-BOT Illustration | Curtailment of Concession due to high traffic

Example 2: Bid TCV = INR 5,000 Cr, planned concession = 5 years

Here, Concession year decreased to 4 years as bid TCV has been recovered

| Year | Actual toll revenue | 3y MCLR in the year | NPV(tolls collected) | Remaining TCV | Verdict             |
|------|---------------------|---------------------|----------------------|---------------|---------------------|
| 2025 |                     | 9.00%               | 0                    | 5,000 Cr      |                     |
| 2026 |                     | 9.00%               | 0                    | 5,000 Cr      |                     |
| 2027 | Construction period | 9.10%               | 0                    | 5,000 Cr      | Construction period |
| 2028 |                     | 9.20%               | 0                    | 5,000 Cr      |                     |
| 2029 |                     | 9.05%               | 0                    | 5,000 Cr      |                     |
| 2030 |                     | 9.10%               | 0                    | 5,000 Cr      |                     |
| 2031 | 2,500 Cr            | 9.00%               | 1,301 Cr             | 3,699 Cr      | Continue            |
| 2032 | 2,800 Cr            | 9.10%               | 1,299 Cr             | 2,400 Cr      | Continue            |
| 2033 | 3,000 Cr            | 9.20%               | 1,238 Cr             | 1,162 Cr      | Continue            |
| 2034 | 3,200 Cr            | 9.30%               | 1,173 Cr             | -10 Cr        | Terminate           |
| 2035 |                     |                     |                      |               |                     |
| 2036 |                     |                     |                      |               |                     |
| 2037 |                     |                     |                      |               |                     |

### How to calculate

NPV (tolls collected)

$$= \frac{\text{Actual toll}}{(1 + \text{discounting rate})^{(\text{Year} - 2025)}}$$

Discounting rate

= SBI's 3year MCLR that year + 2.5%  
(as per MoRTH)

Remaining TCV

= Remaining TCV in previous year - NPV(tolls collected in that year)  
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Verdict

= if Remaining TCV in that year > 0  
→ Continue, else Terminate  
OR, if concession period = 40 years  
→ Terminate

Concession period will be capped at a maximum of 40 years, beyond which even if NPV(Toll revenues) is not equal to TCV, the concession period will be terminated.



Improvised Variable BOT

VGF given to  
ensure attractive  
returns for  
Concessionaire

Information shared herewith is  
indicative and may be subject to  
change.

| Expected IRR<br>(incl. ancillary revenues) |        |         |         |         |         |
|--------------------------------------------|--------|---------|---------|---------|---------|
| VGF →                                      | 0% EPC | 10% EPC | 20% EPC | 30% EPC | 40% EPC |
| 4+25                                       | 7-8%   | 8-9%    | 10-11%  | 12-14%  | 15-17%  |
| 4+30                                       | 8-9%   | 9-10%   | 11-12%  | 13-15%  | 16-18%  |
| EPC = Estimated Project Cost               |        |         |         |         |         |

  
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# Improvised-BOT (Toll): Key Clauses in the RFP and MCA



## RFP Clause 1.2.6 and 1.2.7 | Bidding Process - Selection

Bids are invited for the Project on the basis of the **lowest Total Concession Value (the "TCV")** required by a Bidder for implementing this Package of the Project. Here, TCV represents the NPV of the toll revenues that the developer seeks to recover during the concession period.

The TCV shall reflect the additional revenue necessary for the developer, in addition to the VGF from Authority and ancillary revenue streams (as defined in the Concession Agreement), to cover all project-related costs, including construction, financing, and operation and maintenance (O&M) expenses, within the projected concession period. The project will be awarded to the bidder offering the lowest TCV.

The **Concession Period is variable**, as indicated in the Concession Agreement. While the Authority has an **Estimated Concession Period of 34 years**, starting from the Appointed Date, (including 4 years 2 months of construction) based on its financial modeling, the **Concession Period may be extended beyond this estimate (to a maximum of 44 years)**, if the NPV of toll revenues collected during the Estimated Concession Period (discounted at the rate set by the Authority) falls short of the Total Concession Value (TCV) quoted by the Concessionaire at the time of bidding. Conversely, the Concession Period may be terminated as soon as the present value of toll revenues collected during the period becomes equal to the TCV quoted by the Concessionaire.

The TCV amount shall constitute the sole criteria for evaluation of Bids. Subject to Clause 2.1.6, the Project will be awarded to the Bidder quoting the lowest TCV. In this RFP, the term "Lowest Bidder" shall mean the Bidder who is seeking the lowest TCV.

Based on this TCV bid, the Government shall provide Viability Gap Funding over and above the TCV to support financial feasibility as the anticipated toll revenues are insufficient to cover the Total Project Cost. **The VGF will be equivalent to 40% of the Estimated Project Cost**, amounting to INR XX Crores (40% of XX Crores).

Generally, the Lowest Bidder in terms of the lowest TCV bid, shall be the "Selected Bidder". However, the Selected Bidder for Project shall be finalized and awarded, which is more beneficial to the Authority. The remaining Bidders shall be kept in reserve and may, in accordance with the process specified in Clause 3 of this RFP, be invited to match the Bid submitted by the Lowest Bidder in case such Lowest Bidder withdraws or is not selected for any reason except the reasons specified in Clause 1.2.11 and 3.8 of RFP. In the event that none of the other Bidders match the Bid of the Lowest Bidder, the Authority may, in its discretion, either invite fresh Bids from the remaining Bidders or annul the Bidding Process.

For the purpose of evaluation, bidders will quote the NPV of the toll revenues that they seek to collect over the concession period (the "TCV"). For the purpose of reviewing the concession period, the Authority shall discount the toll revenues collected each year using the following discount rate: **SBI's 3-year MCLR rate + 2.5%**, as applicable in that year.

  
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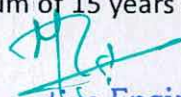
## DCA Article 3 | Grant of Concession (1/3)

Subject to and in accordance with the provisions of this Agreement, the Applicable Laws and the Applicable Permits, the Authority hereby grants to the Concessionaire the concession set forth herein including the exclusive right, license and authority to design, construct, operate and maintain the Project (the "Concession") for a period of 34 (thirty four) years commencing from the Appointed Date, and the Concessionaire hereby accepts the Concession and agrees to implement the Project subject to and in accordance with the terms and conditions set forth herein and in accordance with Applicable Laws.

**\*Thirty-Four years is the Estimated Concession Period.** As per the Improvised-BOT model, the **Concession Period shall be variable** to ensure that the Concessionaire is able to recover the bid TCV, as per Clause 3.1.1(A).

The Concession Period will be reassessed regularly to monitor toll collections and determine necessary adjustments:

- The Concession Period shall be reviewed annually at the end of each year
- If the discounted value of realized toll revenues falls below the bid Total Concession Value (TCV), the Concession Period shall be extended in increments of one year until the actual toll revenues reaches 90% of the bid TCV.
- Once the discounted value of actual toll revenues reaches 90% of the bid TCV, the review frequency shall shift to monthly. As soon as the bid TCV is met, the Concession Period shall be terminated immediately.
- For discounting the toll revenues each year, the Authority shall apply floating rate as follows: SBI 3-year MCLR rate + 2.5%.
- The Concession Period may be extended by a maximum of 10 years beyond the Estimated Concession Period. If, after 44 years, the discounted toll revenues remain below the bid TCV, no further extensions shall be allowed. Only in case of construction of an additional tollway, the Concession Period may be extended by a maximum of 15 years beyond the Estimated Concession Period.

  
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## DCA Article 3 | Grant of Concession (2/3)

Subject to and in accordance with the provisions of this Agreement, the Concession hereby granted shall oblige or entitle (as the case may be) the Concessionaire to:

- Right of Way, access and license to the Site for the purpose of and to the extent conferred by the provisions of this Agreement.
- finance and construct the Project Tunnel.
- manage, operate and maintain the Project Tunnel and regulate the use thereof by third parties.
- demand, collect and appropriate Fee from vehicles and Users liable for payment of Fee for using the Project Tunnel or any part thereof and refuse entry of any vehicle if the Fee due is not paid.
- perform and fulfil all of the Concessionaire's obligations under and in accordance with this Agreement.
- save as otherwise expressly provided in this Agreement, bear and pay all costs, expenses and charges in connection with or incidental to the performance of the obligations of the Concessionaire under this Agreement; and
- neither assign, transfer or sublet or create any lien or Encumbrance on this Agreement, or the Concession hereby granted or on the whole or any part of the Project Tunnel nor transfer, lease or part possession thereof, save and except as expressly permitted by this Agreement or the Substitution Agreement.
- Construct, maintain, operate and collect appropriate Fee from users for the Ancillary revenue streams.

  
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## DCA Article 3 | Grant of Concession (3/3)

Developers are expected to monetize spaces within intermodal hubs and tunnels as follows:

**From the tunnel:**

- Tolls from buses: The Concessionaire may collect tolls from buses in addition to tolls from passenger vehicles.
- Advertisement and branding rights: The Concessionaire may auction naming rights for entry/exit ramps and intermodal hubs, as well as monetize advertisement spaces in toll booths and intermodal hubs for additional revenue, in line with existing and future advertising policies of the BBMP.

**From the inter-modal hubs:**

- Parking and retail spaces in five intermodal hubs: Concessionaire may utilize spaces in the intermodal hubs (ensuring layouts in line with DPR) to create parking spaces and retail spaces for additional revenues. The parking fees shall be bound by the policies of BBMP in effect at the time. The land for these hubs shall be provided to the Concessionaire by the Government.

The land on which the intermodal hubs are developed, including all associated structures, shall be handed over to the Authority upon the termination of the Concession Period. The risk for ancillary revenues as well as any additional costs related to the same shall be borne solely by the Concessionaire. While these revenues will not be included in the calculations for review of the Concession Period, the Concessionaire must make all records of ancillary revenue available for audits as and when directed by the Authority

  
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## DCA Article 25 | Grant

An amount equal to **40% of the Estimated Project Cost** [..... (Rupees ..... crore)] shall be due and payable to the Concessionaire in 10 (ten) equal instalments during the Construction Period in accordance with the provisions of Clause 25.5.2 (the "Construction Support").

Upon receiving a report from the Independent Engineer certifying the achievement of the below-mentioned Payment Milestones, the Authority shall disburse, within 15 (fifteen) days of the receipt of each such report, an instalment equal to one-tenth of the amount mentioned in Clause 25.5.1. For the purpose of this Clause 25.5.2, the Payment Milestone for release of payment during Construction Period shall be as under:

1. (first) Payment Milestone - On achievement of 5% Physical Progress
2. (second) Payment Milestone - On achievement of 10% Physical Progress
3. (third) Payment Milestone - On achievement of 20% Physical Progress
4. (fourth) Payment Milestone - On achievement of 30% Physical Progress
5. (fifth) Payment Milestone - On achievement of 40% Physical Progress
6. (sixth) Payment Milestone - On achievement of 50% Physical Progress
7. (seventh) Payment Milestone - On achievement of 60% Physical Progress
8. (eighth) Payment Milestone - On achievement of 70% Physical Progress
9. (ninth) Payment Milestone - On achievement of 80% Physical Progress
10. (tenth) Payment Milestone - On achievement of 90% Physical Progress

Footnote: Independent Engineer, during finalization of design, shall further decide weightages of all the items in due consultation with the Authority based on the construction schedule and recommend percentage physical progress. Subject to the conditions specified in Clause 25.5.2, the Construction Support shall be credited to the Escrow Account and shall be applied by the Concessionaire for meeting the Project Cost.

  
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## 4.5 Novel Development Model: Ballooning Hybrid Annuity Model



## HAM (Hybrid Annuity Model) is another development model for greenfield assets

Non exhaustive

### Financial Outlay Required by Government

Government funds 40% of project cost as a construction grant, rest financed by the developer, sharing the financial burden and incentivizing private investment

### Revenue Risk for Government

Government retains toll revenue control, assuming revenue risk while providing developers with fixed annuity payments, ensuring predictable cash flow for developers

### Construction Risk for Government

Low construction risk for Government as developers handle 60% of funding and execution; phased construction grant reduces immediate financial exposure

### Incentive for Quality of Construction

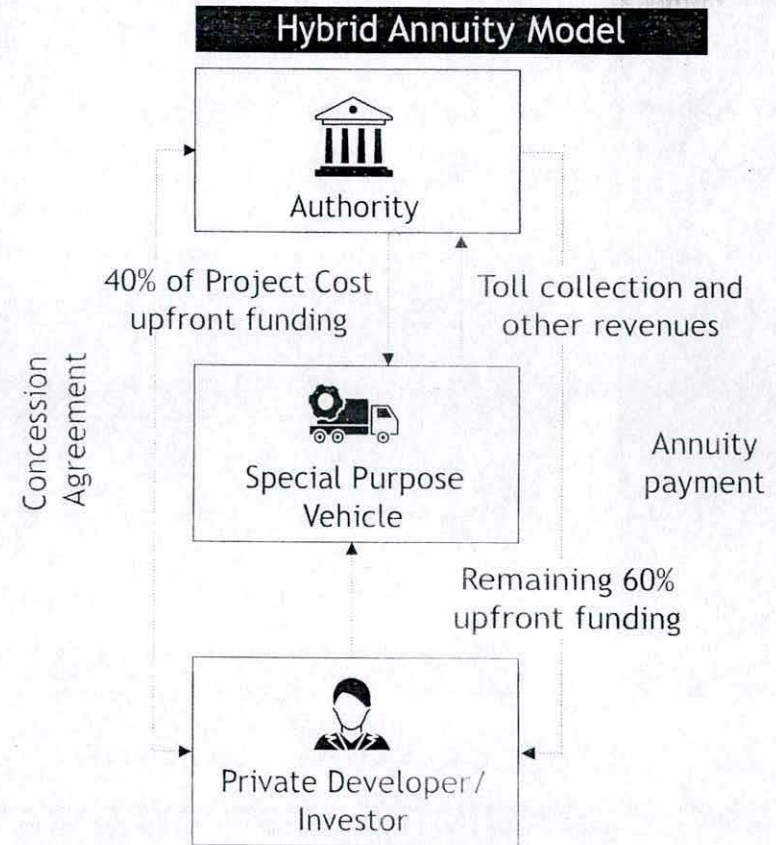
Performance-based annuity payments tied to quality encourage high construction standards and lower long-term maintenance costs

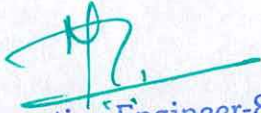
### Risk of Toll Leakages

Toll collection remains under government control, minimizing leakage risk and allowing government to optimize revenue extraction

### Flexibility in Policy Adjustments

Moderate flexibility with inflation-indexed annuity payments and a fixed 15-year operations period for operational stability and adaptability within set terms



  
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## Hybrid Annuity Model

The conventional Hybrid Annuity Model may experience negative cash flows during the initial 5-6 years, as tolling revenues may not have fully matured

| Years | Package I (INR Cr) |     |                            |               |               | Package II (INR Cr) |     |                            |               |               | Combined (INR Cr) |     |                            |               |               |
|-------|--------------------|-----|----------------------------|---------------|---------------|---------------------|-----|----------------------------|---------------|---------------|-------------------|-----|----------------------------|---------------|---------------|
|       | VGf                | O&M | Annuity +Interest Payments | Toll Revenues | Net Cash flow | VGf                 | O&M | Annuity +Interest Payments | Toll Revenues | Net Cash flow | VGf               | O&M | Annuity +Interest Payments | Toll Revenues | Net Cash flow |
| FY26  | 764                |     |                            |               | (764)         | 750                 |     |                            |               | (750)         | 1514              |     |                            |               | (1514)        |
| FY27  | 764                |     |                            |               | (764)         | 750                 |     |                            |               | (750)         | 1514              |     |                            |               | (1514)        |
| FY28  | 1146               |     |                            |               | (1146)        | 1126                |     |                            |               | (1126)        | 2272              |     |                            |               | (2272)        |
| FY29  | 764                |     |                            |               | (764)         | 750                 |     |                            |               | (750)         | 1514              |     |                            |               | (1514)        |
| FY30  | 382                |     |                            | 162           | (220)         | 375                 |     |                            | 144           | (231)         | 757               |     |                            | 306           | (451)         |
| FY31  |                    | 9   | 817                        | 698           | (128)         |                     | 10  | 832                        | 623           | (218)         |                   | 19  | 1,649                      | 1,322         | (347)         |
| FY32  |                    | 19  | 808                        | 750           | (76)          |                     | 19  | 822                        | 670           | (171)         |                   | 38  | 1,630                      | 1,421         | (247)         |
| FY33  |                    | 19  | 797                        | 799           | (17)          |                     | 19  | 811                        | 712           | (118)         |                   | 38  | 1,607                      | 1,511         | (134)         |
| FY34  |                    | 19  | 784                        | 855           | 52            |                     | 19  | 798                        | 760           | (57)          |                   | 38  | 1,583                      | 1,615         | (5)           |
| FY35  |                    | 28  | 772                        | 911           | 111           |                     | 29  | 786                        | 814           | (1)           |                   | 57  | 1,558                      | 1,725         | 110           |
| FY36  |                    | 38  | 758                        | 973           | 177           |                     | 38  | 772                        | 870           | 60            |                   | 76  | 1,530                      | 1,843         | 237           |
| FY37  |                    | 38  | 744                        | 1,040         | 258           |                     | 38  | 758                        | 927           | 131           |                   | 76  | 1,502                      | 1,967         | 388           |
| FY38  |                    | 38  | 729                        | 1,099         | 332           |                     | 38  | 742                        | 972           | 192           |                   | 76  | 1,471                      | 2,071         | 524           |
| FY39  |                    | 38  | 713                        | 1,151         | 401           |                     | 38  | 726                        | 1,022         | 258           |                   | 76  | 1,439                      | 2,173         | 659           |
| FY40  |                    | 38  | 696                        | 1,207         | 474           |                     | 38  | 709                        | 1,077         | 330           |                   | 76  | 1,405                      | 2,284         | 803           |
| FY41  |                    | 38  | 678                        | 1,267         | 552           |                     | 38  | 690                        | 1,139         | 410           |                   | 76  | 1,368                      | 2,406         | 962           |
| FY42  |                    | 38  | 658                        | 1,335         | 639           |                     | 38  | 670                        | 1,201         | 492           |                   | 76  | 1,328                      | 2,535         | 1131          |
| FY43  |                    | 38  | 624                        | 1,407         | 746           |                     | 38  | 636                        | 1,262         | 588           |                   | 76  | 1,260                      | 2,670         | 1334          |
| FY44  |                    | 38  | 611                        | 1,484         | 836           |                     | 38  | 622                        | 1,324         | 664           |                   | 76  | 1,233                      | 2,808         | 1500          |
| FY45  |                    | 38  | 576                        | 1,560         | 946           |                     | 38  | 587                        | 1,396         | 771           |                   | 76  | 1,163                      | 2,955         | 1717          |

For instance, during FY 2030-2035,

The projected toll revenue is insufficient to cover the annuity outflows, resulting in negative cash flows for the firm.

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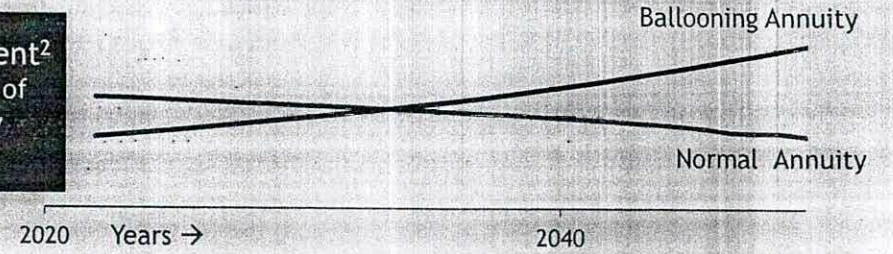
# Ballooning HAM<sup>1</sup> | Annuity payments to increase at 6% YoY in line with toll revenue projections, to ease upfront payment burden on Authority

## Annuity required

Total annuity amount = Bid Project Cost minus VGF

Scope to change the annuity payment schedule for the Authority, ensuring the NPV of annuity payments remains consistent for the developer's cost recovery

Annuity Payment<sup>2</sup>  
(as a % of NPV of total annuity amount)



| Scenario 1 | Usual Annuity payments schedule (Annuity + interest payments) |      |      |      |      |      |      |      |      |      |     |      |      |      |      |      |      |      |      |      |      |      |
|------------|---------------------------------------------------------------|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|
| Payments   | 1                                                             | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | ... | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   |
| % Annuity  | 7.3%                                                          | 7.2% | 7.2% | 7.2% | 7.1% | 7.1% | 7.0% | 6.9% | 6.9% | 6.8% |     | 6.2% | 6.1% | 6.0% | 5.9% | 5.8% | 5.7% | 5.4% | 5.4% | 5.5% | 5.2% | 6.2% |
| Payment    | 827                                                           | 822  | 818  | 812  | 807  | 801  | 794  | 789  | 782  | 776  |     | 698  | 689  | 679  | 669  | 659  | 642  | 617  | 614  | 619  | 595  | 567  |

| Scenario 2 | Ballooning annuity schedule escalating at 6% in line with the traffic projections to make net cash flows positive |      |      |      |      |      |      |      |      |      |     |      |      |      |      |      |      |      |       |       |       |       |
|------------|-------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|------|-------|-------|-------|-------|
| Payments   | 1                                                                                                                 | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | ... | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27    | 28    | 29    | 30    |
| % Annuity  | 4.7%                                                                                                              | 4.8% | 5.0% | 5.1% | 5.3% | 5.4% | 5.6% | 5.7% | 5.9% | 6.1% |     | 8.1% | 8.4% | 8.6% | 8.9% | 9.1% | 9.4% | 9.7% | 10.0% | 10.3% | 10.6% | 10.9% |
| Payment    | 531                                                                                                               | 547  | 563  | 580  | 597  | 614  | 633  | 651  | 671  | 690  |     | 924  | 951  | 979  | 1008 | 1038 | 1069 | 1100 | 1133  | 1166  | 1201  | 1236  |

Reduced upfront financial burden of Govt. due to ballooning annuities

1. For both Package I and Package II combined

2. The annuity percentage is determined based on the Residual Bid Project Cost (post-VGF deduction) which is disbursed as annuity payments

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## Ballooning Hybrid Annuity Model

### Proposed HAM model...

VGF at 40% for BPC for both the packages

**4 + 15 years**  
Construction + Annuity  
repayment period

**Ballooning annuity  
payment**  
starting at INR 1,078 Cr in 1<sup>st</sup>  
year, increasing by 6% YoY



**Equity IRR of 15%**  
Assuming bid project cost around  
INR 19k Crores for both packages

**Bid Parameter:  
Project Cost**

...with ballooning annuity payments which helps manage the cash outflows for both govt. & developer

| Combined (INR Cr) for Package I + II |      |     |                      |                  |                 | Developer       |
|--------------------------------------|------|-----|----------------------|------------------|-----------------|-----------------|
| Year                                 | VGF  | O&M | Annuity+<br>Interest | Toll<br>revenues | Net<br>cashflow | Debt<br>Service |
| FY26                                 | 1514 |     |                      |                  | (1514)          | 0               |
| FY27                                 | 1514 |     |                      |                  | (1514)          | 0               |
| FY28                                 | 2272 |     |                      |                  | (2272)          | 0               |
| FY29                                 | 1514 |     |                      |                  | (1514)          | 0               |
| FY30                                 | 757  |     |                      | 306              | (451)           | 0               |
| FY31                                 |      | 19  | 1,078                | 1,322            | 225             | 832             |
| FY32                                 |      | 38  | 1,143                | 1,421            | 240             | 1014            |
| FY33                                 |      | 38  | 1,211                | 1,511            | 262             | 957             |
| FY34                                 |      | 38  | 1,284                | 1,615            | 293             | 901             |
| FY35                                 |      | 57  | 1,361                | 1,725            | 307             | 844             |
| FY36                                 |      | 76  | 1,443                | 1,843            | 325             | 787             |
| FY37                                 |      | 76  | 1,529                | 1,967            | 362             | 731             |
| FY38                                 |      | 76  | 1,621                | 2,071            | 374             | 674             |
| FY39                                 |      | 76  | 1,718                | 2,173            | 379             | 617             |
| FY40                                 |      | 76  | 1,821                | 2,284            | 387             | 560             |
| FY41                                 |      | 76  | 1,931                | 2,406            | 400             | 197             |
| FY42                                 |      | 76  | 2,046                | 2,535            | 413             | 0               |
| FY43                                 |      | 76  | 2,169                | 2,670            | 425             | 0               |
| FY44                                 |      | 76  | 2,299                | 2,808            | 433             | 0               |
| FY45                                 |      | 76  | 2,437                | 2,955            | 442             | 0               |

For Example:

In FY 2036  
The projected toll  
revenue of INR 1,843  
Crores is expected to  
cover the annuity  
outflow of INR 1,443  
Crores, while also  
ensuring the developer  
can service their debt  
obligation of INR 787  
Crores

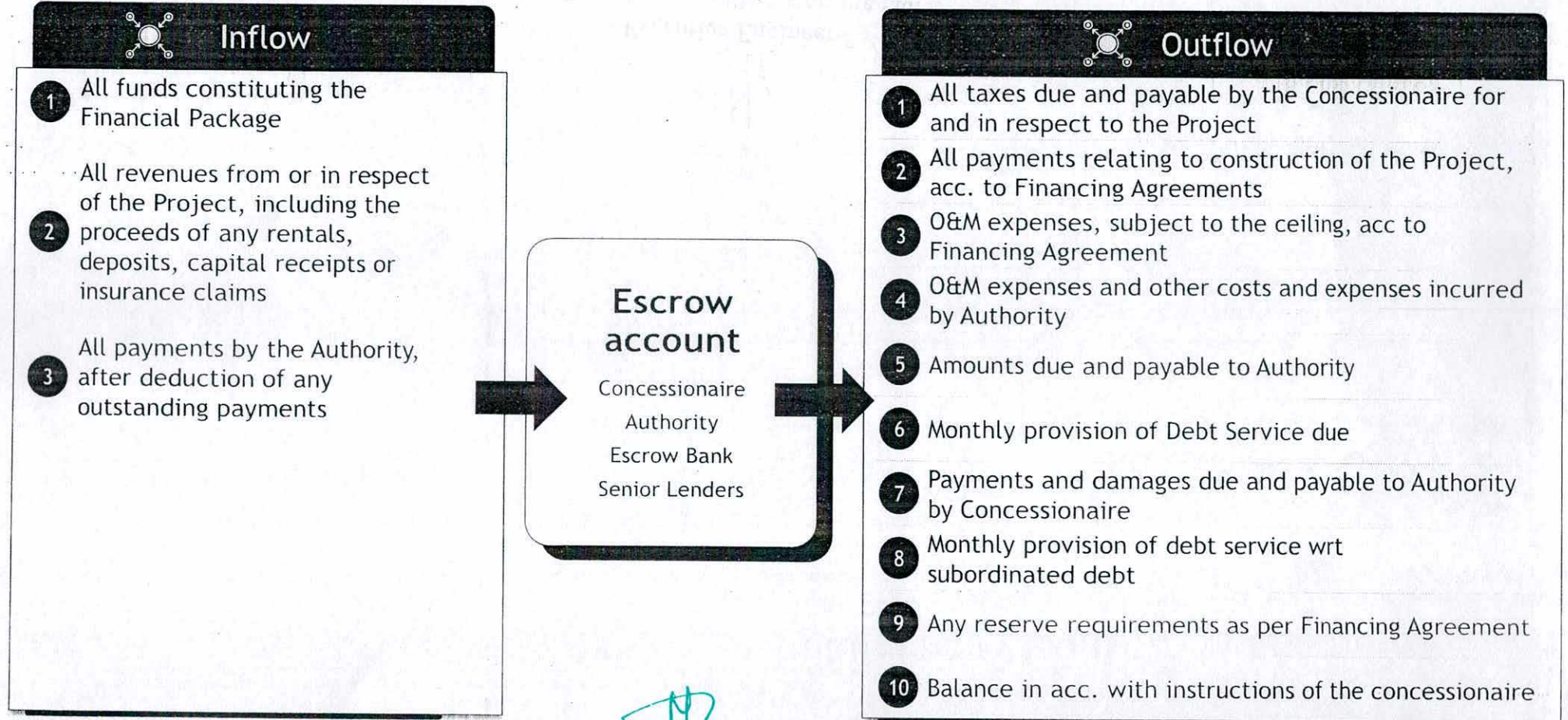
1. Cashflows table for 4+15 years, 40% VGF at bid project cost of INR 19,000 Cr to ensure equity IRR of 15% for both the packages
2. Annuity payments made as per ballooning HAM model of repayment
3. O&M payments calculated at 0.2% of Bid Project Cost for initial 5 years and then at 0.4% - North Tunnel guidelines

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## Escrow Account to manage Payment Risk | Order of payments



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## HAM RFP | Fixed concession and VGF with Bid Project Cost as bid parameter

1

### Bid Parameter: Bid Project Cost

#### 3.8 Selection of Bidder

Subject to the provisions of Clause 2.16.4, the Bidder whose Bid is adjudged as responsive in terms of Clause 3.2 and whose Bid Project Cost is the lowest shall be declared as the selected Bidder (the "Selected Bidder") as per procedure defined as under...

RFP for NHAI Project, 2024

2

### Bid Project Cost: absolute amount in INR Crores

#### Appendix IB: Letter comprising the Financial Bid

I/We hereby submit our Bid consisting of Bid Project Cost of Rs. .... (Rs ..... in words) excluding GST for undertaking the aforesaid Project in accordance with the Bidding Documents and the Concession Agreement.

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RFP for NHAI Project, 2024

3

### Concession period: 5+20 Years

#### 3.1.1 The Concession

The concession set forth herein including the exclusive right, license and authority to construct, operate and maintain the Project (the "Concession") during the Construction Period of\*\*\*\*\* ( ) days and Operation Period of [15 (Fifteen) years] commencing from COD .....

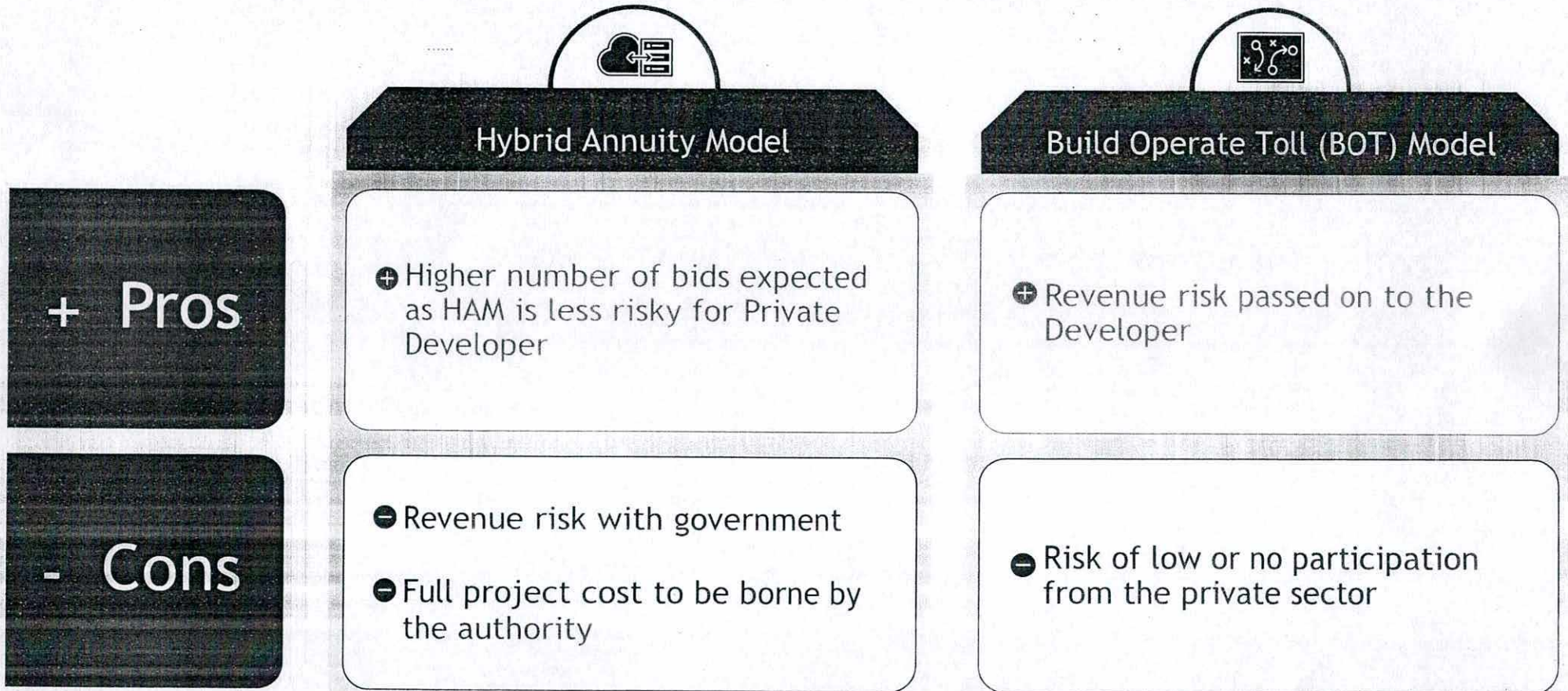
MCA for HAM, MoRTH 2020

Bid Project Cost shall be inclusive of the cost of construction, interest during construction, working capital, physical contingencies and all other costs, expenses and charges for and in respect of construction of the Project (except variation in Price Index, Change of Scope, Change in Law, Force Majeure and each of this Agreement, GST) - MCA

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The twin tunnel project can be executed via both HAM & BOT models, but BOT is expected to attract few bids, whereas HAM is likely to receive higher interest



  
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## 4.5 Financial Model and Scenario Analysis



Sensitivity Analysis on financial model

Impact of changes in traffic and cost projections on equity IRR on concessionaire

1. Analysis conducted on the financial model provided by DPR consultant

Sensitivity of EIRR in the Variable BOT model  
(with concession period extended to 4+40 years)

The variable concession period, with a maximum increase of 10 years, will ensure healthy returns (EIRR > 15%) only if:

1

The project cost is within 105% of the current estimated cost, traffic being the same

| Impact of Cost         |       |
|------------------------|-------|
| With Base Case Traffic |       |
| Change in Cost         | EIRR  |
| Base case              | 16.7% |
| +5%                    | 15.3% |
| +10%                   | 14.2% |
| +15%                   | 13.2% |

2

The traffic is within 90% of the current estimated traffic, cost being the same

| Impact of Traffic   |       |
|---------------------|-------|
| With Base Case Cost |       |
| Change in Traffic   | EIRR  |
| Base case           | 16.7% |
| -5%                 | 15.9% |
| -10%                | 15.0% |
| -15%                | 14.2% |

The EIRR mentioned is for Package 2, which is slightly less attractive due to higher cost and lower traffic projections.



In addition to toll revenues, the tunnel can generate ancillary revenues: Add. 10-15% of toll revenues can be unlocked every year across 4 key categories

|     | Levers                            | Annual Value Potential      | Description                                                                                                                                                                                                          |
|-----|-----------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 a | Retail spaces in Intermodal nodes | INR 70 - 80 Crores          | The rental revenue for two planned retail floors, covering a 100 m x 50 m area with a 70% rental coverage, has been calculated based on market rental values and BBMP zonal classifications (across 5 nodes)         |
| 1 b | Parking in Intermodal nodes       | INR 20 - 25 Crores          | Parking revenue has been estimated for two planned parking floors, each with two levels, accommodating 100 cars per level, a 60% occupancy rate, and a parking charge of INR 25 per hour (across 5 nodes)            |
| 1 c | Naming rights and branding        | INR 30 - 40 Crores          | Drawing on historical agreements for metro stations like Konappana Agrahara (Infosys), Hebbagodi (Biocon), Bommasandra (Delta), and Lakkasandra (Bosch), anticipated revenue of approx. INR 2 Crores/station         |
| 2   | Bus bays tolling                  | INR 130 - 150 Crores        | Estimated revenue is based on a toll rate of 3.4 times the car PCU toll rate (INR 1100 for full length - MoRTH) with an expected 3% composition of buses in total traffic, according to traffic volume data -Rodric. |
| 3   | Utility Renting (Telecom and OFC) | INR 15 - 20 Crores          | Projected revenue from leasing tunnel space for 50 optical fiber pairs (vs. 20 in metro tunnels) as tunnels has more than 5x the utility space, at INR 5000 per km/pair/month (BMRCL rate) for telecom companies     |
|     |                                   | <b>INR 250 - 300 Crores</b> |                                                                                                                                                                                                                      |

1. Note: Inflation of 5-6% to be assumed to increase the revenue potential.

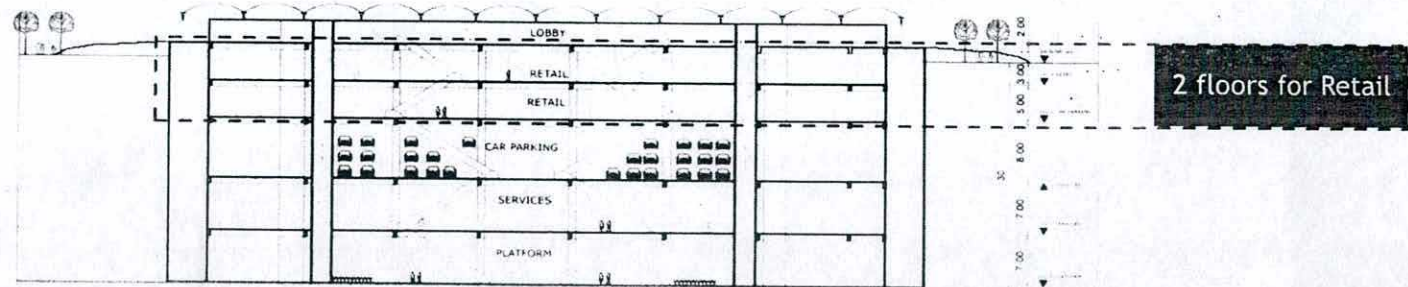
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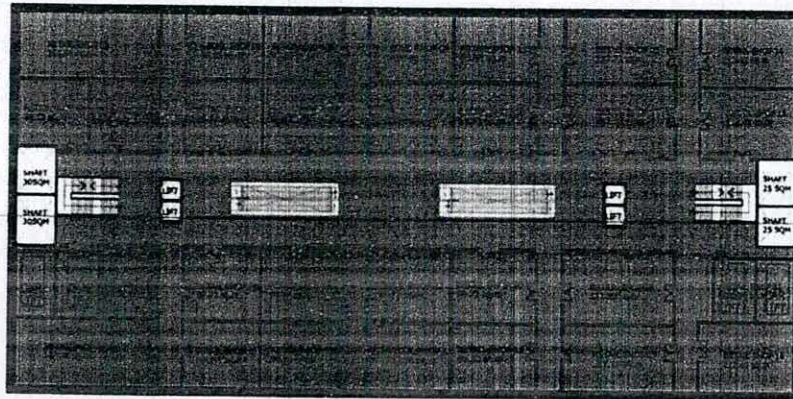


Intermodal Hubs - Context: 5 Intermodal Hubs planned across the tunnel at the vertical shaft points - total area of 2.6L sq.ft. across the 5 Hubs

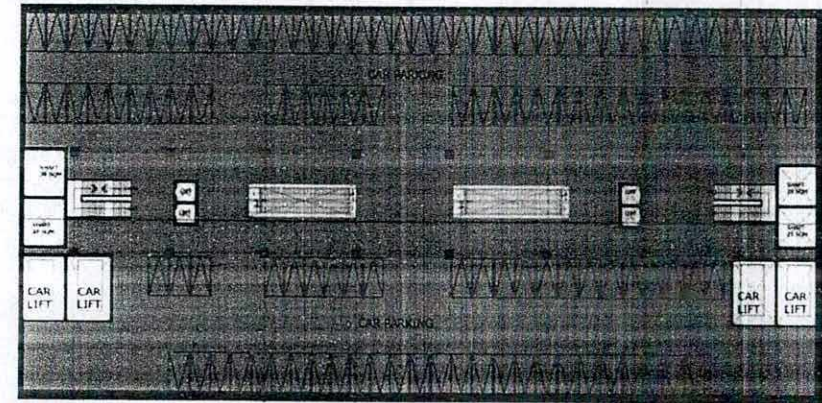
Five floors are planned within the intermodal nodes



Retail Floors tentative Layout



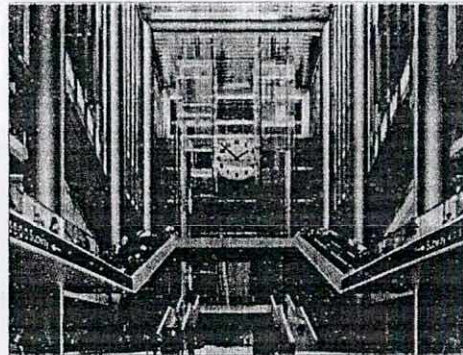
Parking Floors tentative Layout





## Intermodal Hubs - Retail Rentals | 2 floors can be rented out for retail spaces

| Benchmarks                           | Description                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port Authority, New York             | - Leased retail spaces at bridge and tunnel plazas to generate revenue from various food, beverage, and retail outlets, including Brooklyn National Deli, Carlo's Bakery, Duane Reade/Walgreens, Dunkin' Donuts, Hudson, Jamba Juice, Land of Beer, Starbucks, Villa Italian Kitchen, Zaro's Family Bakery, and others.<br>Rentals : Total \$42M in 2023 |
| The New York State Thruway Authority | - The service plazas include outdoor dining areas, Taste NY (Governor Cuomo's initiative to showcase New York products), and a farmer's market.<br>- Some service areas provide electric vehicle charging stations.                                                                                                                                      |



| S No. | Place of Intermodal change   | Area (sqft) | Area (Acres) | Categorization | Rental rate per sqft |
|-------|------------------------------|-------------|--------------|----------------|----------------------|
| 1     | Hebbal Junction              | 53,370      | 1.23         | B              | INR 70               |
| 2     | Palace Ground /Mekhri Circle | 53,370      | 1.23         | B              | INR 70               |
| 3     | Race - course                | 53,370      | 1.23         | A              | INR 100              |
| 4     | Lalbagh                      | 53,370      | 1.23         | B              | INR 70               |
| 5     | Silk Board                   | 53,370      | 1.23         | C              | INR 50               |
|       |                              | 2,66,850    | 6.13         |                |                      |

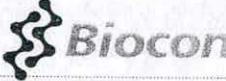
The rental revenue for two planned retail floors, covering a 100 m x 50 m area with a 70% rental coverage, has been calculated based on market rental values and BBMP zonal classifications (across 5 nodes)

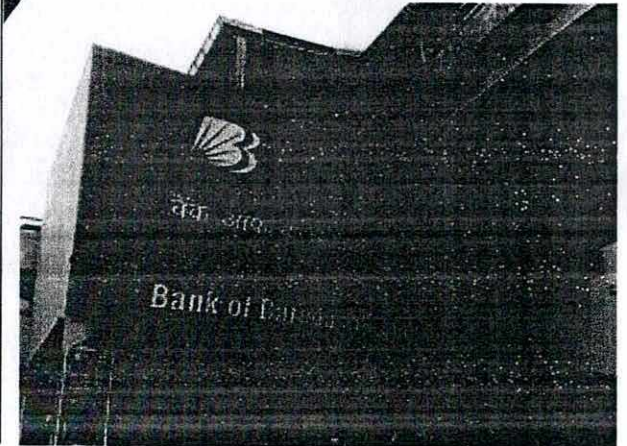
INR 70 -  
80 Crores

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Naming & Branding Rights: Naming and branding rights of the intermodal hubs or tunnel entry/exits can be tendered out similar to other Metro stations

| Station            | Company                                                                                   | Revenue (Cr.) | Duration | Remarks                                                              |
|--------------------|-------------------------------------------------------------------------------------------|---------------|----------|----------------------------------------------------------------------|
| Konappana Agrahara | Infosys  | 100           | 30       | Naming rights, Commercial space, walkway access, Advertisement space |
| Hebbagodi          | Biocon   | 65            | 30       | Naming rights                                                        |
| Bommasandra        | Delta    | 75            | 30       | Naming rights, walkway access                                        |
| Lakkasandra        | Bosch  | 10            | 30       | Walkway access                                                       |



Drawing on historical agreements for metro stations like Konappana Agrahara (Infosys), Hebbagodi (Biocon), Bommasandra (Delta), and Lakkasandra (Bosch), anticipated revenue of approx. INR 2 Crores/hub and an additional INR 20 Crores from naming rights of 10 entry/exit points

INR 20  
- 25  
Crores

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Toll from buses: INR 130-150 Crore p.a. projected by allowing buses; the third lane can also be evaluated for other uses (e.g., electric tram)



|                                                                 |       |            |
|-----------------------------------------------------------------|-------|------------|
| Toll Rates for bus                                              | 6.65  | INR per Km |
| For tunnel, the rate would be 10x according to Morth guidelines | 66.45 | INR per Km |
| Toll for the full tunnel length                                 | 1109  | INR        |
| Bus toll revenue over Car toll revenue                          | 3.4   | x multiple |
| Expected composition of buses in overall Traffic <sup>1</sup>   | 3%    |            |
| Expected annual Tolling revenue from car PCUs (year 1)          | 1300  | Crores     |
| Expected annual Tolling revenue from Bus PCUs                   | 131   | Crores     |

Estimated revenue is based on a toll rate of 3.4 times the car PCU toll rate (INR 1100 for full length - MoRTH guidelines) with an expected 3% composition of buses in total traffic, according to traffic volume data -Rodac.

INR 130  
- 150  
Crores

Source: Morth Guidelines, Traffic Volume Counts survey, Rodac

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## Utilities (Optical Fiber): INR 10 - 15 Crores per annum projected by leasing Optical fiber cables to Telecom companies

### Benchmarks

### Description

#### BMRCL

Leasing excess Optical Fiber Cable (OFC) at INR 5040 per pair per month per km for around 20 pairs over 42.7 kilometers, generating approximately 5 crore annually. Contracted telecom providers include Hathway Digital, Sify Technologies, Shyam Spectra, Hathway Cable, and Datacom Ltd.

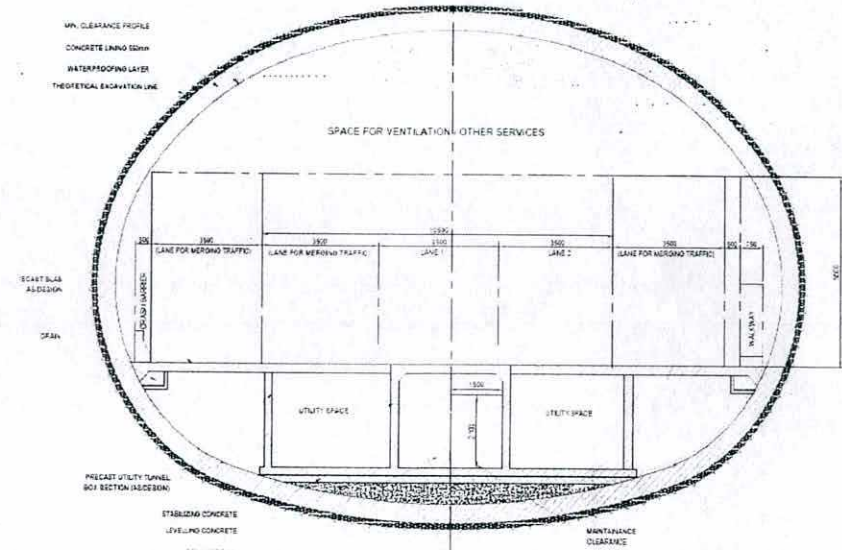
#### Bay Area Rapid Transit (BART)

Bay Area Rapid Transit (BART) in San Francisco has agreements with telecom providers (e.g., Verizon, AT&T) to improve connectivity and generate revenue by leasing existing infrastructure and utility boxes

### Expected revenue from the tunnel by leasing for optical fibre cable for telecom companies

|                 |      |                         |
|-----------------|------|-------------------------|
| Contract Rate   | 5000 | INR/Km/pair/Month       |
| Approx. Pairs   | 50   | double of metro tunnels |
| Length          | 34   | Km (Both tubes)         |
| Approx. revenue | 10.2 | Crores                  |

Projected revenue from leasing tunnel space for 50 optical fiber pairs (vs. 20 in metro tunnels) as tunnels has more than 5x the utility space, at INR 5000 per km/pair/month (BMRCL rate) for telecom companies



INR 15  
- 20  
Crores

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## 4.6 Key proposed changes in the bid documents



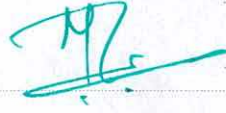
## Proposed Eligibility Criteria

**Estimated Project Cost:**

Pkg1: X Cr

Pkg2: Y Cr

| Criteria                                    | Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Financial Criteria</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Net Worth</b>                            | <ul style="list-style-type: none"> <li>At least 25% of the Estimated Project Cost at the close of the preceding financial year, i.e. INR 0.25X Cr/INR 0.25Y Cr</li> <li>Package 1 will be opened first. The same developer is eligible to win for Package 2 only if their net worth is more than INR 0.25(X+Y) Cr</li> </ul>                                                                                                                                                  |
| <b>Technical Criteria</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Threshold Technical Capability (TTC)</b> | <ul style="list-style-type: none"> <li>Sum of projects in last 10 years should be &gt; 150% of the Estimated Project Cost i.e., INR 1.5XCr/INR 1.5Y Cr, 25% of the TTC should be from Category 1 or 3 (Highways Construction/Project);</li> <li>Minimum size of eligible project = 5% of Estimated Project Cost INR 0.05X Cr/INR 0.05Y Cr</li> </ul>                                                                                                                          |
| <b>Past experience of similar nature</b>    | <ul style="list-style-type: none"> <li>At least one similar work where capex incurred (directly or through EPC contractors) is &gt; 20% of Estimated Project Cost; from Category 1 or 3 (Highways), i.e., INR 0.2X Cr/INR 0.2Y Cr</li> </ul>                                                                                                                                                                                                                                  |
| <b>Past experience in tunnels</b>           | <ul style="list-style-type: none"> <li>At least one tunnel in last ten years with TBM machine(s) and cost &gt; INR 1,000 Cr, such that:               <ul style="list-style-type: none"> <li>If roads: dia <math>\geq</math> 2-lane highway, length &gt; 2km</li> <li>If metro: dia <math>\geq</math> 5.5m, length &gt; 10km (cumulative length)</li> </ul> </li> <li>Bidder may have pre-bid EPC contract/Consortium with EPC player who satisfies this condition</li> </ul> |

  
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## Eligibility Criteria | Updated basis inputs in pre-consultation meeting

| Criteria                                    | Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Financial Criteria</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Net Worth</b>                            | <ul style="list-style-type: none"> <li>At least 25% of the Estimated Project Cost at the close of the preceding financial year, i.e. INR 2,193 Cr/INR 2,232 Cr</li> <li>Package 1 will be opened first. The same developer is eligible to win for Package 2 only if their net worth is more than INR 4,425 Cr</li> </ul>                                                                                                                                                          |
| <b>Technical Criteria</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Threshold Technical Capability (TTC)</b> | <ul style="list-style-type: none"> <li>Sum of projects in last 10 years should be &gt; 150% of the Estimated Project Cost i.e., INR 13,155 Cr/ INR 13,392 Cr</li> <li>25% of the TTC should be from Category 1 or 3 (Highways Construction/Project);</li> <li>Minimum size of eligible project = 5% of Estimated Project Cost INR 439 Cr/INR 447 Cr</li> </ul>                                                                                                                    |
| <b>Past experience of similar nature</b>    | At least one similar work where capex incurred (directly or through EPC contractors) is > 20% of Estimated Project Cost; from Category 1 or 3 (Highways), i.e., INR 1,754 Cr/INR 1,786 Cr                                                                                                                                                                                                                                                                                         |
| <b>Past experience in tunnels</b>           | <ul style="list-style-type: none"> <li>At least one tunnel in last ten years with TBM machine(s) and cost &gt; INR 1,000 Cr, such that: <ul style="list-style-type: none"> <li>If roads: dia <math>\geq</math> 2-lane highway, length &gt; 2km</li> <li>If metro: dia <math>\geq</math> 5.5m, length &gt; 10km (cumulative length over last 2 years)</li> </ul> </li> <li>Bidder may have pre-bid EPC contract/Consortium with EPC player who satisfies this condition</li> </ul> |

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# 5. Integrated Solid Waste Management

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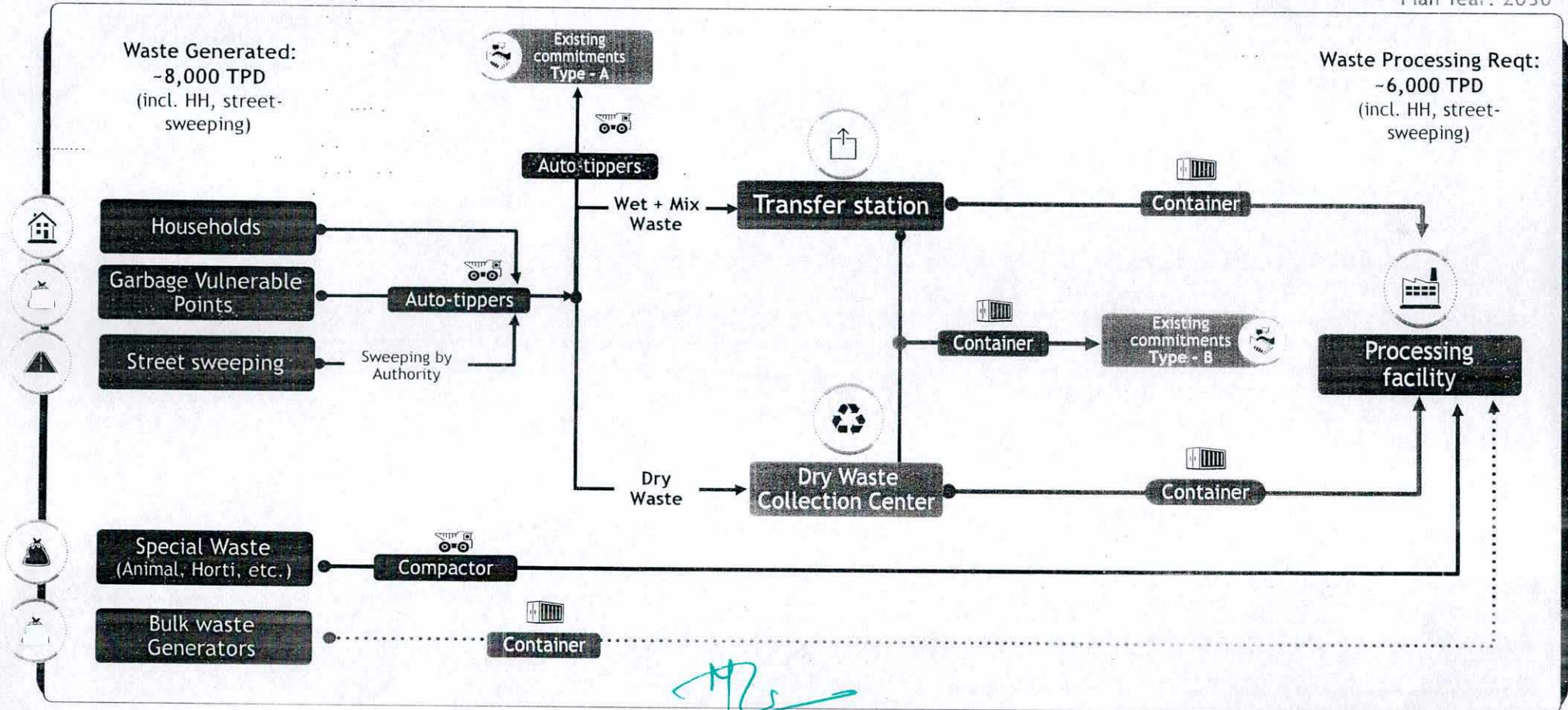
## 5.1 Project Overview

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# Updated Scope | Integrated Solid Waste Management (Steady State)

Plan Year: 2030



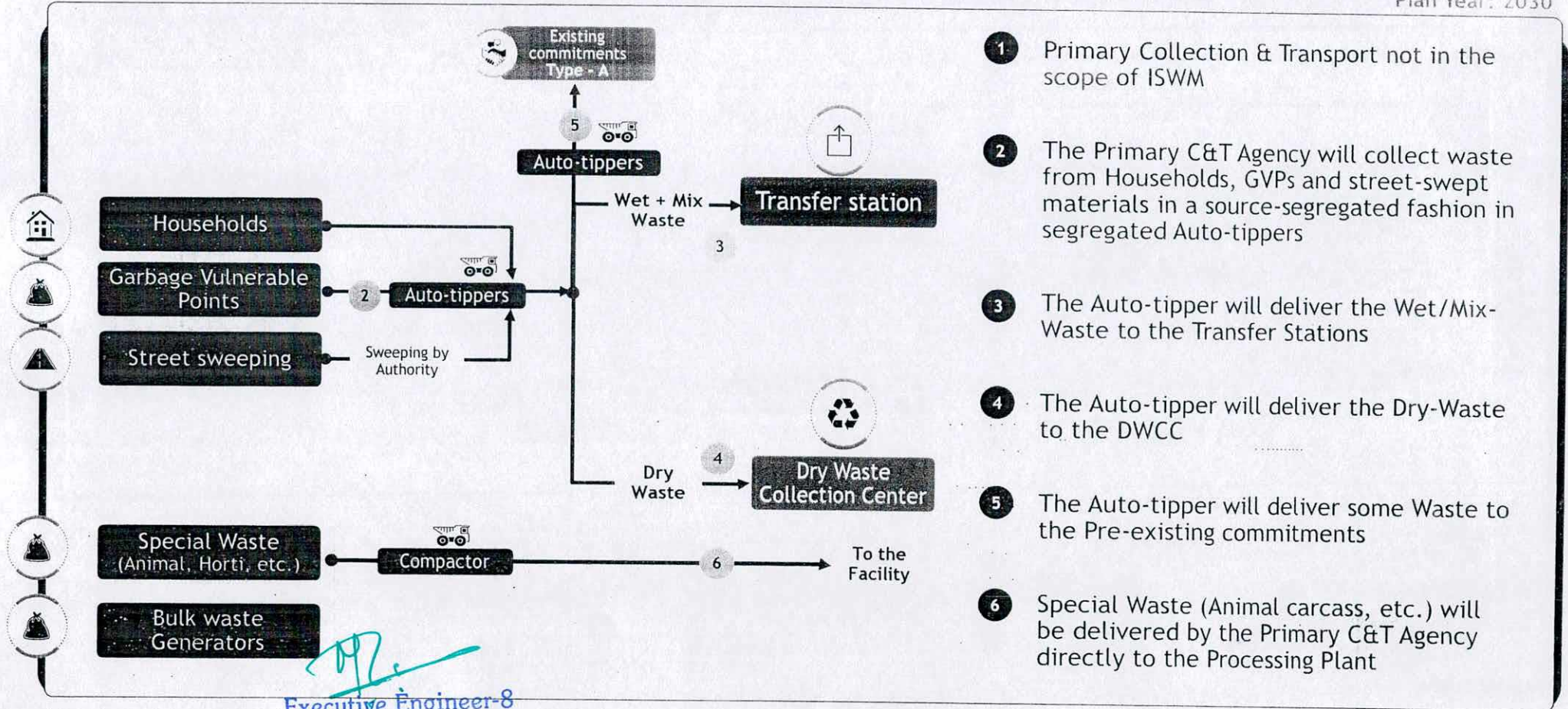
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# Updated Scope | Integrated Solid Waste Management (Steady State)

Plan Year: 2030



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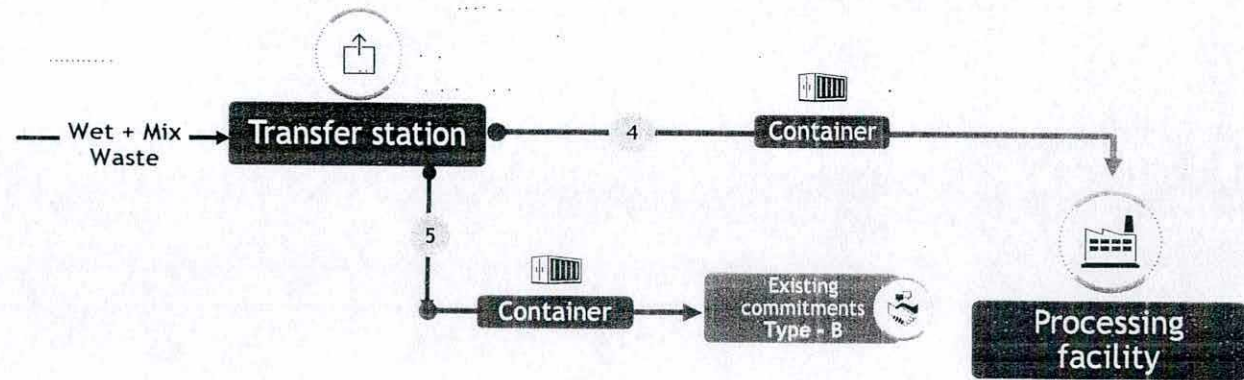
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## Updated Scope | Integrated Solid Waste Management (Steady State)

Plan Year: 2030

- 1 There will be 30 Transfer Stations across the 4 packages which will be handed over to the Concessionaire in a phased manner.
- 2 Existing: 4 Transfer Stations are currently operational, for a duration of 5-7 years. These will be handed over from the Pvt. Party to the Concessionaire after expiry of the contract, along with hook-loaders and containers.
- 3 Planned: 26 Transfer Stations are to be developed by the Authority, over the next 1-2 years. These will be handed over to the Concessionaire, along with civil structures, static compactors, containers, hook-loaders.



- 4 Concessionaire shall transport Waste to the their own Processing Facility using hook-loaders & containers.
- 5 Some Transfer Stations will be notified as tagged to an Existing Commitment. From these Transfer Stations, the Concessionaire shall transport the notified type and quantity of waste to the Existing Plant for the duration of the Commitment contract.

*[Signature]*  
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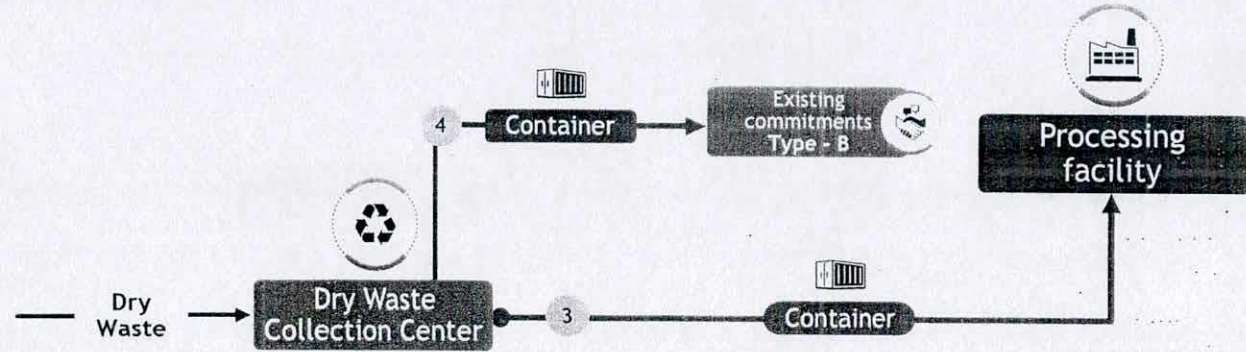
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## Updated Scope | Integrated Solid Waste Management (Steady State)

Plan Year: 2030

- 1 There are ~110 DWCCs operational in the 4 packages. The Dry Waste shall be received by the DWCCs in each Package. These DWCCs will be operated by rag-picker associations.
- 2 Rag-picker associations shall benefit from the sale of recyclables and valuables sorted from the Dry Waste. They will also be responsible for the OpEx costs of the DWCC.
- 3 After the Dry Waste has spent one day at the DWCC, the Concessionaire shall transport the remaining Waste to their own Processing Facility using hook-loaders & containers.
- 4 Some DWCCs will be notified as tagged to an Existing Commitment. From these DWCCs, the Concessionaire shall transport the notified type and quantity of waste to the Existing Plant for the duration of the Commitment contract.



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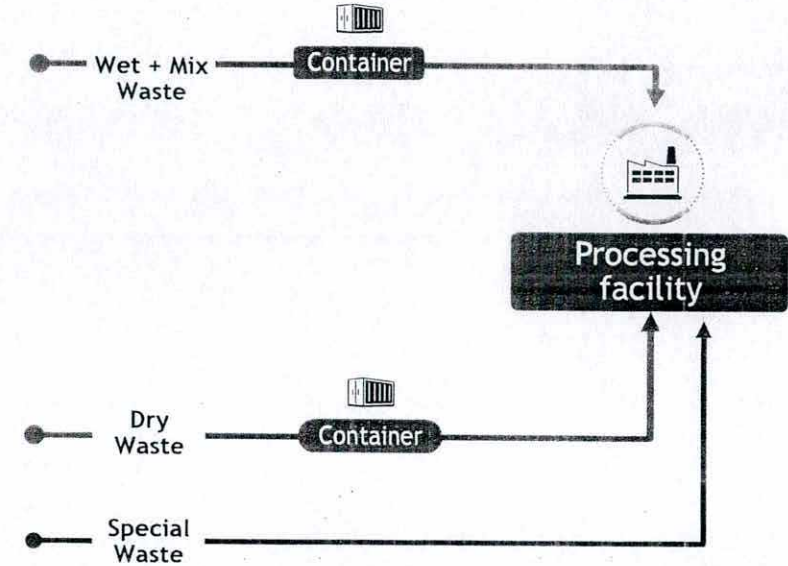
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## Updated Scope | Integrated Solid Waste Management (Steady State)

Plan Year: 2030

- 1 The Concessionaire shall set up a Processing Facility and Disposal Site for managing the Waste generated in each package.
- 2 The current model assumes the following technologies to process the waste:
  - a. Waste-to-Energy Plant (~1,600 TPD)
  - b. Bio-methanation Plant (~3,000 TPD)
  - c. Animal rendering, carcass & sanitary waste plant (~150 TPD)
  - d. Landfill (~1,200 TPD)
- 3 The above split is not binding. The processing facility should be set up to meet the following KPIs:
  - a. Extent of Recovery: More than 70% of the waste received annually shall be processed or recycled, and shall annually increase
  - b. Quantum of waste landfilled: Should be less than 20% of the waste received
  - c. Compliance with Environment, Health, Safety Monitoring Parameters



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## Preliminary view on Bulk Waste Management

Plan Year: 2030

- 1 There are 3000+ Bulk Waste Generators in the Project area. Bulk Waste Generators are defined as:
  - a. Residential waste generators with more than 100 Multi Dwelling Units (MDUs)
  - b. Commercial and Institutional waste generators generating solid waste of more than 100 kgs per day or located on the premises with site area of more than 5,000sqm, or carrying out public events.
- 2 The Concessionaire must ensure that they are empaneled as an **Authorized Waste Processor**. The Concessionaire shall be allowed to collect waste directly from BWGs using it's own vehicles.
- 3 Concessionaire shall collect a Service Charge from the BWGs for provision of this service.
- 4 In exchange for utilizing the Authority's land for this commercial activity, the Concessionaire shall do Revenue Sharing with the Authority for each TPD of Bulk Waste processed.
- 5 Revenue Sharing will be calculated as per the declared waste amounts of each BWG and the same shall be deducted by the Authority from the tipping fee to be paid.

Processing  
facility

Bulk waste  
Generators

Container

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## 5.2 Project Structuring



## Difference in Packages

Preliminary study, Work in Progress

Packaging | Each package emerges to be distinct w.r.t. 1.5x population difference and 8x difference in existing capacity

|                                   |         | Package 1 | Package 2 | Package 3 | Package 4 | Combined |
|-----------------------------------|---------|-----------|-----------|-----------|-----------|----------|
| Planned Population (Year 2030)    | Million | 3.6       | 5.5       | 4.5       | 5.6       | 19.2     |
| Secondary Planned Waste           | TPD     | 1,500     | 2,200     | 1,800     | 2,300     | 8,000    |
| (less) Existing Commitments       | TPD     | 850       | 700       | 100       | 400       | 2,000    |
| Processing & Disposal Requirement | TPD     | 700       | 1,600     | 1,700     | 2,000     | 6,000    |

For 2030 Plan Year, excluding BWGs.

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## Existing Commitments | 2,238 TPD committed to facilities across packages

| Existing Capacity | Package 1                                | Package 2                                             | Package 3                               | Package 4                                      | Total (TPD)      |
|-------------------|------------------------------------------|-------------------------------------------------------|-----------------------------------------|------------------------------------------------|------------------|
| 1 Sani waste      | 15 TPD<br>Kogilu<br>(Commissioned, 15y)  |                                                       | 10 TPD<br>Gunjur<br>(Commissioned, 15y) |                                                | 25               |
| 2 Animal Waste    | 8 TPD<br>Kogilu<br>(Commissioned, 15y)   |                                                       |                                         |                                                | 8                |
| 3 Wet Waste       | ☆ 750 TPD<br>MSGP<br>(In operation, 10y) |                                                       |                                         | ☆ 300 TPD<br>GAIL<br>(to be commissioned, 30y) | 1305             |
|                   | 26 TPD<br>(Bio-meth plants)              | 26 TPD<br>(Bio-meth plants)                           | 26 TPD<br>(Bio-meth plants)             | 26 TPD<br>(Bio-meth plants)                    |                  |
| 4 Dry Waste       |                                          | ☆ 600 TPD<br>WTE Plant KPCL, Bidadi<br>(In operation) |                                         |                                                | 900              |
|                   | 75 TPD<br>Coconut Processing             | 75 TPD<br>Coconut Processing                          | 75 TPD<br>Coconut Processing            | 75 TPD<br>Coconut Processing                   |                  |
| <b>Total</b>      | <b>874 TPD</b>                           | <b>701 TPD</b>                                        | <b>111 TPD</b>                          | <b>401 TPD</b>                                 | <b>2,088 TPD</b> |

Additionally, 7 Wet Waste Processing Plants operated by BSWML (6) + Pvt Agency (1) to be de-commissioned  
Open point: Need date of COD of plants not operational yet + Duration of agreements of all plants

  
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## 5.3 Project Financial Model

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## Key Updates to the Financial Model

1

## Fundamental Changes

- ⬆ a. Project IRR changed from 12% to 15%
- ✓ b. Waste generated by Floating Population changed from 400g/capita to 100g/capita
- ⬆ c. Model updated to ensure 2 years of construction; costs escalated accordingly

2

## Changes in Scope of Work

- ⬆ a. DWCCs, BWG removed from scope
- ✓ b. Smaller, de-centralized existing plants removed from Secondary C&T and P&D scope
- ⬆ c. Cost of operating Transfer Stations added
- ✓ d. Procurement of hook-loaders and containers, vehicle washing system removed from scope, shall be handed over by BSWML as part of Transfer Station



3

## Changes in Assumptions

- ⬆ a. Opex escalation reduced from 6.5% to 5% per annum
- ⬆ b. Life of all processing plants considered as 15 years, except WTE at 30 years, with 30% salvage
- ✓ c. Economics of Waste to Energy Plant updated basis Bidadi WTE and Hyderabad WTE plant

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## Financial Model

Tipping Fee estimate revised based on updated scope & financial model

Preliminary study, Work in Progress

1

### Tender floated

Plan Year 2023

12% Project IRR

2

### Revised Estimate

Plan Year 2030

15% Project IRR

### Tipping Fee

C&T

INR 2,343 per TPD

P&D

INR 655 per TPD

Total Tipping Fee

INR 2,998 per TPD

Primary C&T

INR 1,500 per TPD

Secondary C&T

INR 743 per TPD

P&D

INR 1,487 per TPD

Total Tipping Fee

INR 3,730 per TPD

INR 2,230 per TPD

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## Benchmarks | Other Mun. Corporations offering similar or higher tipping fee

| City                         | Hyderabad                            | Delhi                             | Goa                | Chennai                                            | Indore (ULB)                                          |
|------------------------------|--------------------------------------|-----------------------------------|--------------------|----------------------------------------------------|-------------------------------------------------------|
| Year                         | 2009                                 | 2009                              | 2023               | 2024/25                                            | -                                                     |
| Scope                        | Secondary C&T and P&D (WTE, compost) | C&T and Processing (WTE, compost) | P&D (WTE, compost) | C&T Street-sweeping                                | C&T Drain-silting                                     |
| Grant/VGF                    | INR 250 Crores                       | 30% of Capex                      | -                  | -                                                  | -                                                     |
| Tipping Fee/TPD <sup>3</sup> | INR 1,431                            | INR 1,960                         | INR 6,224          | INR 4,400 <sup>1</sup>                             | INR 4,200 <sup>2</sup>                                |
| Inflation Adjusted Fee/TPD   | INR 2,600                            | INR 3,124                         | -                  | INR 4,400 <sup>1</sup>                             | -                                                     |
| Capacity                     | 8,000 TPD                            | 700-1,000 TPD <sup>4</sup>        | 250+250TPD         | -                                                  | -                                                     |
| Comment                      | Escalation: 5% + 60% of WPI annually | Escalation: 3.5% per annum        | N/A                | Performance-based monthly payment (no tipping fee) | Collection Fee from households (>80% collection rate) |

Chennai, Delhi 2016, Hyderabad, Lucknow: Ramky; Delhi 2020: ILFS and Metro Waste; Indore: Municipal Corporation

1. No tipping fee model in Chennai, this is an estimated figure. 2. Spent by IMC. 3. Amount tendered. 4. Increasing every year till end of concession

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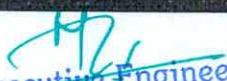
  
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